James Hender
Glasgow

THE

CHEMICAL EXPERIMENTALIST

OR

An attempt to allure by Experiment,

AND GUIDE BY REASONING,

THE ENQUIRER AFTER

RATIONAL AMUSEMENT and USEFUL KNOWLEDGE,

Towards the cultivation of the simple and sublime Science—

CHEMISTRY.

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"THE MONITOR" on Consumption—THE SILENT FRIEND
—"THE DIRGE" on Cholera—THE ARCANA OF LIFE,
&c. &c.

DECOMPOSITION is that death-like scene,
Where Nature's laws decree, incessant, universal change;
While COMPOSITION's generative womb,
Prolific, gives birth, new form of life, and re-creates the whole.

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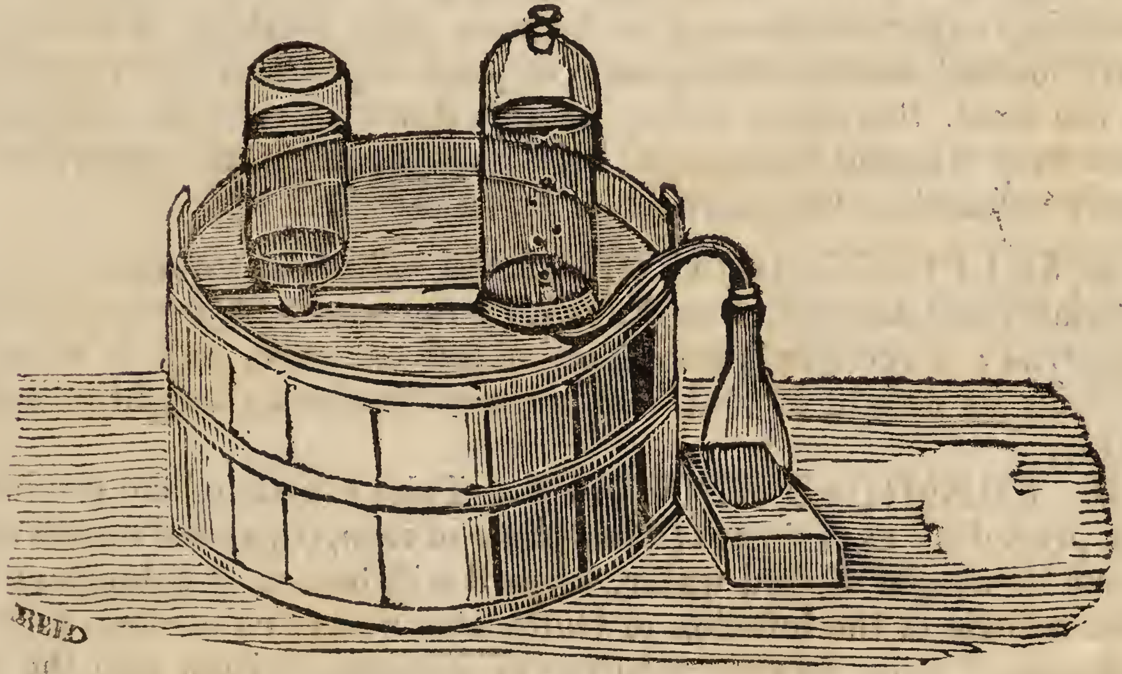
CHEMISTRY.

1. PNEUMATIC TROUGH.



2. CHEMISTRY is that science which makes known to us those laws, which regulate the changes by which all natural bodies pass from their simple state to that of compound, and also by which compound bodies are reduced back to their simples; as for instance,

3. WATER is a compound of two simple bodies, which exist naturally in the state of gas; the one is called HYDROGEN and the other OXYGEN.

4. If we introduce into a bottle one ounce of clean iron filings, and pour upon them a mixture of Sulphuric Acid *(oil of vitriol)* and water, in the proportions of one part of acid to six of water, hydrogen gas will be evolved in great quantities.

5. Those laws of *nature* which modify *matter ;* in the foregoing experiment are the following:—The clean iron filings do neither make, nor give out hydrogen, neither does the sulphuric acid—but the water does—that is to say: The oxygen of the water leaves the hydrogen, and becomes incorporated with the iron, and forms what has been by chemists called the oxide of iron (rust)—thus the hydrogen of the water is set at liberty and may be caught in a receiver as represented in the figure (1) and the use of the acid is merely to dissolve the oxide (or rust) so that a clean surface of the iron filings may always be exposed to the action of the oxygen of the water.

6. The experimenter will not throw away the residuum of the experiment, but filter, evaporate, and crystalize, as in this experiment he has not only formed hydrogen gas, but also the Sulphate of Iron,

(copperas,—green vitriol) which he ought to keep in a well stopt bottle, with a label attached stating where? and when? and how he made it, this being the first fruits of his own chemical manufacture.

7. The cost of the ingredients for the experiment (4) will be nearly as follows, one ounce filings of Iron, the trouble gathering at an obliging blacksmith's bench,—one ounce Sulphuric Acid ¼ d, as it is sold by retail at 4d. a pound—six ounces of water. Thus for one farthing and a little trouble, may be performed a beautiful and interesting experiment—and to balance your farthing of outlay you have formed nearly half a pound of pure sulphate of iron (copperas), at the least, therefore, I may set this down as rational amusement and truly "*useful knowledge*" as the residuum of the experiment is more value than the ingredients made use of.

8. SULPHATE OF IRON—forms beautiful transparent green crystals; and has been long known by the names of *green vitriol* and *copperas;* it reddens a decoction of red cabbage, and is dissolved in twice its weight of cold, and in three-fourths its weight of boiling water.

9. CHEMICAL AFFINITY.—Take a little of the product of the preceding experiment (4) sulphate of iron, (6, 8) and dissolve it in twice its weight of cold water, when it will be nearly colourless, also take a little of the infusion of Galls, also nearly colourless, pour the infusion of galls into the solution of sulphate of iron, and the mixture will produce an intense black. *Observation*—Sulphate of Iron, as you know by experiment, (4) is Sulphuric Acid and Iron, and the infusion of Galls contains Gallic Acid and Tannin (17) and gallic acid has a greater *affinity* or *tendency* to unite with iron than sulphuric acid has. The consequence is, the sulphate of iron is decomposed, and the Tanno-Gallate of Iron is produced, whilst the sulphuric acid is set at liberty—Such is the whole science of chemistry, viz. composition and decomposition, in this experiment the sulphate of iron is decomposed and the tanno-gallate of iron is composed.

10. TANNO-GALLATE OF IRON—is black and would fall to the bottom of the vessel by precipitation, leaving the supernatent liquor clear and colourless; but to suspend the gallate in the fluid, nothing but a little gum is required, and thus we form writing ink.

11. GOOD WRITING INK.—Take finely bruised Galls, three ounces;—Sulphate of Iron, one ounce;—Logwood shavings, one ounce;—and of Vinegar, one quart,—Put these ingredients into a bottle, and agitate them occasionally for twelve or fourteen days, then let the courser parts subside, and pour off the ink for use.

Note. The tendency of ink to become mouldy is prevented by keeping a few cloves in the ink bottle, or by dissolving about three grains of corrosive sublimate in each pint:—but recollect *corrosive sublimate* is virulent Poison.

12. RUSSIAN INK POWDER.—Blue Galls, two ounces; Gum Arabic, half an ounce;—Sulphate of Iron, four ounces; all powdered and well mixed together.

13. TO STAIN WOOD BLACK.—A strong decoction of Logwood, Galls, and Sulphate of Iron, with Acetous Acid *(vinegar)*, forms a jet black for staining wood.

Note. It adds greatly to the effect to heat the wood at a fire, both before and after the application of the staining liquor.

14. A SYMPATHETIC INK.—Write your letter with Tincture of Galls *(galls steeped in spirits)* and dry it, let the person to whom it is sent be advised to brush it over with a solution of Sulphate of Iron, and the writing will become visible.

Note. To prevent suspicion, a letter may be wrote of trifling import, with common ink, and the sympathetic ink used to write between the lines.

15. GALLIC ACID—Is procured from the well known excresences called gall-nuts, which are formed on different kinds of oaks. By reducing them to powder, infusing them in water, and exposing the infusion for some time to the action of the air, taking care to remove the mould, from time to time, which forms on the surface; crystals of the acid form, which being dried and sublimed in a glass vessel; are procured in a state of purity, having left behind the tannin with which they were united. Gallic acid is very susceptable of decomposition. Exposure to the air has this effect. It does not precipitate the proper alkalies in solution, but with barytes, strontites, and lime waters, it produces a bluish colour, and flaky precipitates by its union with these alkaline earths respectively. It has the property of throwing down several of the metals, and this it does by reducing them almost entirely to the metallic state. Gold is completely reduced by it.

It is composed of	4 atoms hydrogen	4
	6 atoms carbon	36
	3 atoms oxygen	24

Its atomic weight or equivalent number is therefore 64

16. NATURAL TANNIN—Is also obtained from gall-nuts, it is also found in abundance in an astringent drug, called catechu, and more or less in various barks. It is brown, hard, brittle, breaking with a resinous fracture, and its taste is bitter and astringent. Soluble in either hot or cold water, solution of a brown colour, not very liable to change from exposure to the air, if the tannin be pure. The most important use of tannin is that of converting the hides of animals into leather, by forming an insoluble compound with the gelatine of the hides, or animal glue. It is the test of glue, or gelatine, *(as it is termed)* in solution, by the precipitate it causes; and a solution of pure gelatine, *in like manner*, readily indicates the presence of tannin. Tannin has little effect upon metals, but precipitates their oxides.

17. TANNIN AND GALLIC ACID.—Tannin is combined with gallic acid; in the decoction of galls, and produces a black colour with sulphate of iron or green vitriol, viz. the Tanno-Gallate of iron (see 10, 11, 12) which constitutes the basis of writing ink.

18. JAPAN WRITING INK.—Boil four ounces of Logwood one hour in six quarts of water, supplying the deficiency as it wastes; strain the decoction, and add more water to make the quantity up to five quarts; *if it be deficient*, and while the liquor is still hot, add twenty ounces of bruised Aleppo Galls; four ounces of Sulphate of Iron, previously calcined to whiteness; three ounces of brown sugar; six ounces of Gum Arabic, and half an ounce of Acetate of Copper, set the vessel past for fourteen days, frequently agitating it, during the above time; afterwards let it stand at rest till the coarser parts have fallen to the bottom, then pour off and bottle for use.

19. In these tracts on Chemistry I do not mean to tread in the beaten path that has been so often trode, by repeating and filling up the half of the work with common-place preliminary truisms, such as, a cork floats on water because it is lighter,—and a piece of sugar immersed in water becomes dissolved,—that iron is solid,—and oil liquid—These are matter of fact statements, that every child may know, who has any understanding at all, to hold converse with its bodily senses, in short; that has not been born an *idiot*:—I shall not therefore mock your judgment and waste your time by repeating such stuff, but instead of expending two hundred pages of my work in laying down a THEORY before I begin by experiment to illustrate it; I shall expect those *(for whom I write)* to know that *air* is not *water*,—that *water* is not *cork*,—that iron is solid,—oil liquid,—and that sugar is soluble in water.

20. The plan of this work will be to go on by experiment, as I have begun, *theorizing*, or explaining those laws of nature which regulate the results of the particular experiment under consideration, as I go along—and in order that the study may be rendered as alluring as possible, I will, after such experiments, as allow of it, give instructions for the preparation of some substance or substances, that have been found useful in the ARTS and MANUFACTURES or even in domestic household economy; these Recipes—or secrets *if I may so call them*, will be introduced so as to illustrate the experiment preceding them, and these again will have the advantage of the chemical experiment to explain the scientific mode of conducting them to the most advantage; thus shall I endeavour to combine the pleasure of rational and intellectual enquiry, with amusing, interesting, experimental enjoyment, and although last not least—truly useful knowledge.

21. For the advantage of those who are inclined to study chemistry, and also for my own convenience in LECTURING, I will not adopt the common method of dragging my readers through a mysterious labrynth of prefatory mystifications, upon ELECTRICITY, GALVANISM, MAGNETISM, GRAVITATION, with a whole catalogue of attractions, repulsions, cohesions, aggregations, and affinities, but will rather select some simple substance, with which I will perform as many experiments as shall seem necessary to illucidate its own proper nature and qualities, and so far as the results of these experiments will allow; I will introduce new experiments, with the residuums

of the old, so that; with the smallest outlay and the least possible trouble, you may have the greatest number of experiments—and these experiments of the most diversified nature possible, inasmuch, as we shall follow nature through her intricate meanderings studying those laws that regulate her progressive movements in giving birth to new productions.

22. HYDROGEN GAS—(4) ATOMIC, EQUIVALENT—1—is colourless, tasteless, fatal to animal life when taken into the lungs, it is the lightest of all bodies which are known to possess weight one hundred cubic inches, weigh only two grains and one-tenth, it is inflammable, but it extinguishes flame.

23. MINIATURE BALLOONS.—Fill a bladder with the gas (4), and into its open extremity fix a common tobacco pipe; prepare some soap suds, such as children use to blow soap bubbles with; dip the mouth of the pipe's head in them, and compress the bladder, globes of solution of soap filled with Hydrogen Gas will be formed which may be shaken from the pipe, and will ascend to the ceiling, this is a simple illustration of *Aërostation,* as this gas is the lightest of all gases, it is therefore, in other words, more bouyant, and on that account is best fitted for filling Balloons.

24. If one of these soap balloons, be overtaken in its flight by a lighted taper, it will explode, and give a vivid flash of light.

25. DETONATING BALLOONS.—Fill a bladder with two parts hydrogen gas, and one part of oxygen gas;— soap balloons, blown with this mixture ascend slowly and explode violently, when touched with a lighted taper as in the last experiment.

26. THE PHILOSOPHER'S LAMP.—Put into a common beer bottle, the ingredients (4)—and cork it with a cork having a glass tube, or the stalk of a tobacco pipe, introduced about half an inch through it, and perhaps six or eight inches above and outside of it, in a short time the gas will be heard or seen rushing from the top of the pipe, it is necessary to let all the common air escape before you apply the light, because if it were not all expelled, it along with oxygen explodes violently (experiment 25, 26) and would blow the bottle to atoms.

27. PHILOSOPHICAL TRUMPET.—Take a tube from two to three feet in length and from two to three inches wide and open at both ends—bring it down slowly over the flame of the philosopher's lamp, (26) and pleasing sounds resembling those of an Æolian Harp; will be produced, by raising and depressing the tubes gradually over the flame the musical chord may be greatly varied.

28. HYDROGEN GAS, EXTINGUISHES FLAME.—Fill a strong Phial that will hold about four ounces of water, with this gas; keeping its mouth downwards, introduce into it a lighted taper which has been burning some time previous, its flame will be extinguished in a moment but the gas will burn at the mouth of the Phial with a pretty blue flame—when you withdraw the taper again, if

done slowly and cautiously it will be relighted, the cause for which is, Hydrogen only burns in contact with Oxygen, and as atmospheric air, contains about one fifth part of it, therefore; it became lighted at the mouth of the bottle, although the taper was extinguished within it.

29. EXPLOSION OF HYDROGEN AND OXYGEN.—If two parts of common air, and one part of hydrogen, be mixed in a strong phial capable of holding four ounces of water, it will inflame upon presenting a candle to it; not silently as in the last experiment, but suddenly and with a loud report:—the bottle should be wrapped round with a cloth to prevent accidents, in case it might burst during the explosion. Note. The result is water.

30. A FOUNTAIN OF FIRE.—Take two parts of granulated zinc, one part of phosphorous, (say; ten grains phosphorous and twenty of zinc), and pour on it, half an ounce of water, with a quarter an ounce of sulphuric acid, (oil of vitriol) in a short time *phosphuretted hydrogen* gas will be produced, extinguish the lights, and beautiful jets of blue flame will be seen to dart from the bottom of the liquid, while its surface will be covered with a luminous smoke. This is a beautiful experiment and is easily performed.

31. PHOSPHURETTED HYDROGEN—is a gaseous compound of Phosphorous and Hydrogen, it is extremely combustible, inflames by mere contact with the atmosphere, in oxygen gas it inflames with a brilliant white light,—with chlorine it detonates with a brilliant green, it has a disagreeable smell resembling putrid fish, and combines in but a very slight degree with water.—It has been supposed that those lights observed about a church-yard, and where animal matters are putrifying, are produced by the formation and inflammation of this gas, these lights are vulgarly called, *Jack o' the Lantern— Will of the Wisp—Ignis-fatui, and Spunkie.*

32. PHOSPHURETS—are compounds of phosphorous with metallic and other bases; Phosphuret of Sulphur is employed to form matches, for the production of instantaneous light,—Phosphuret of Lime has the remarkable property of decomposing water, when a piece of it is thrown into water the hydrogen that is liberated unites to a portion of the phosphorous, and forms phosphuretted hydrogen —which takes fire on coming in contact with atmospheric air.

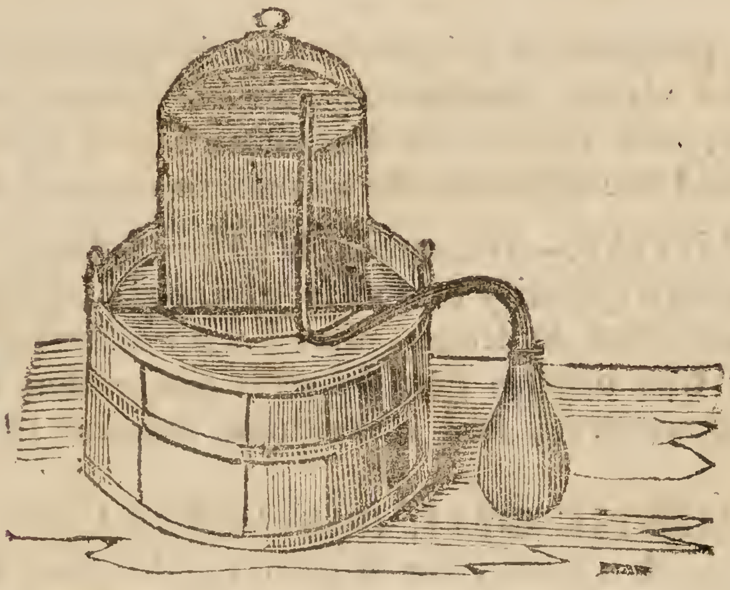
33. TO FORM A PHOSPHORIC FIRE BOTTLE.—Put about the size of a pea of phosphorous into a small phial about the size of one used for hair oil, let it be dry—heat a wire and with the hot end of it melt the phosphorous and spread it over the inside of the phial, and cork it—the fire bottle is now formed,—all that is required to get a light is merely to take a sulphur match, turn it two three times round in the bottle, rub it on a cork and it will inflame.

Dr. Stuart's medical tract, No. 10

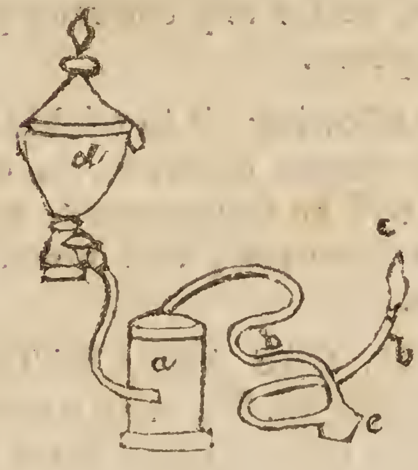
Being No. 2, of the

CHEMICAL EXPERIMENTALIST.

34. PNEUMATIC APPARATUS, No. 2.



35. OIL GAS APPARATUS.



36. ARSENURETTED HYDROGEN—is a compound of Arsenic and Hydrogen in the form of gas. It is inflamable, it extinguishes flame, and destroys animal life in an instant.

37. TELLURETTED HYDROGEN—is a gaseous compound of Tellurium and Hydrogen, it is soluble in water; combines with the alkalies, burns with a blue flame, and smells like rotten eggs.

38. POTASSURETTED HYDROGEN.—If we pass Hydrogen and Potassium through a tube heated to whiteness, the metal potassium becomes dissolved in the gas and potassuretted hydrogen is the result; this gas inflames spontaneously.

Note. There is little interesting in the above three compounds, farther than that each of the metals, Arsenic,—Tellurium,—and Potassium, are simple bodies, and although hydrogen be the lightest of all bodies, these metals become soluble in it, and assume the form of gas.

39. CARBURETTED HYDROGEN—is colourless, has little or no smell, is partially soluble in water. It is inflamable and burns with a bright flame, giving out a strong light when mixed with oxygen gas, and ignited, it explodes with violence accompanied with great noise, and the product of the explosion is carbonic acid and water.

40. The progress of science has lately introduced great improvments in the art of illuminating our houses and streets, by means of coal, oil, and rosin—the decomposition of these different substances, yield the inflammable gas above referred to.

41. COAL GAS.—When coal is submitted to a red-heat in close vessels, a large quantity of gas is given off, which consists chiefly of sub-carburetted hydrogen mixed with other inflammable gases, by passing this impure gas through *lime-water* the sulphuretted hydrogen is removed, and a residuum remains in the *retort* called *coke.*

42. DOMESTIC COAL GAS APPARATUS.—Take a large iron kettle with a spout, fix it into the kitchen fire, so that the spout may be raised uppermost, let the kettle be made red-hot, and filling it with coal, let its top be well fastened down, and to its spout let some feet or yards of gas pipe be adapted, and thus a domestic gas apparatus, fit for any common purpose, may be constructed at a trifling expense.

43. OIL GAS.—By allowing oil to trickle into a red-hot retort, part filled with coke or pieces of brick, in order to increase the heated surface, the oil will be decomposed, and a much richer gas will be given off than from coal, and much better fitted for the purpose of illumination.

44. DOMESTIC OIL GAS APPARATUS.—Prepare a close iron vessel or retort, *a*, *(see fig.* 35.*)* with a conical lid, out of which at the top must proceed a tub, *b;* which must take a dip spirally to *e*, the bulb or reservoir; and afterwards ascend from the reservoir by the ascending part of the tube *b*, to the burner *c*, or else gasometer;—it is necessary to put a few pieces of brick into the retort *a*; and when it becomes red-hot, let the oil drop slowly into its centre by the feeding pipe, from the air-tight vessel *d*, full of oil, the drops as they fall upon the bricks in the retort heated nearly to redness, are rapidly converted into gas and fly off by the tube *b*,—Note, the bulb or reservoir *e*, through which the gas passes, serves to catch the oil that passes off in vapour, without being thoroughly decomposed, it contains no mixture of sulphuretted hydrogen. Requires no purification. Requires less for any given quantity of light—and contaminates the air less by its combustion.

45. ROSIN GAS—is equal in quality to oil gas, and costs only about one-fourth of the expense, its smell is much less offensive than either oil or coal gas.

46. SULPHURETTED HYDROGEN GAS.—To procure this gas, put into a retort one part of Sulphuret of Antimony, which may be had at any drug shop; or else, take sulphuret of iron, (see 48) broken down into very small fragments, and pour upon it into the retort; four parts of good Muriatic Acid *(Spirit of Salt)* let a gentle heat be applied, and the gas will be evolved.

47. It is rapidly absorbed by water, but may be collected in glass bottles, provided with glass stoppers, which stoppers must be inserted the moment the bottles are filled with the gas, or by gas apparatus, (such as 34). This gas is a compound of Sulphur and Hydrogen—twice as heavy as the air of our atmosphere—does not support combustion—smells like rotten eggs, or the washings of a gun-barrel. It is highly poisonous,—a large Newfoundland Dog is destroyed in air containing only two-parts in the hundred of it. A horse has been known to perish in an atmosphere containing only 1—250th part of it. It has a sour taste, and reddens vegetable blues—it instantly extinguishes all burning bodies, tarnishes gold, silver, mercury, and blackens white paints made with preparations of lead, on that account it is useful in making the Sympathetic Ink, (see 50, 51). Harrowgate water owes its medicinal properties to an impregnation with this gas.

48. SULPHURET OF IRON—is formed by bringing a roll of Sulphur in contact with a bar of iron heated to a white heat, a portion of the iron will immediately unite to the sulphur, and fall in drops, which may be received in a vessel of water,—it may also be formed by melting equal portions of sulphur and the filings of iron in a crucible, covered over with a little dry sand.

49. LIQUID SULPHURETTED HYDROGEN—is formed by letting the gas into a receiver containing water, and agitating it repeatedly and violently for a minute or so, and again letting in more gas, let it stand five or ten minutes longer, then agitate it again; by this means, in an hour or two it will be strongly impregnated, and may be made exactly to imitate Harrowgate, or Aix-la-Chapelle, mineral waters, it is also useful as a test, or chemical re-agent. With lead it gives a black, and with arsenic a yellow precipitate.

50. SYMPATHETIC INK.—Write upon a paper with Nitrate of Bismuth, and expose it to sulphuretted hydrogen gas, the writing will become black,—or else let it dry and draw it through the sulphuretted hydrogen water and the writing will immediately become visible.

51. PROCESS 2—Write with a solution of super-acetate of lead—the writing will be invisible—put the sheet of paper so wrote upon between the leaves of a book, and fold the book upon it, let a cord

be tied tightly round the book, and place it over the mouth of a bottle from which sulphuretted hydrogen gas is evolved, and the writing will be found to have become visible from the action of the gas, even though thus carefully folded and tied up in the book, shewing at once the penetrating nature of this gas, as also its use as a test for detecting the presence of lead; if the writing with super-acetate of lead be dried and drawn through sulphuretted hydrogen water, (49) the writing will become first black and then glittering like polished silver. *Observation.*—The super-acetate of lead is decomposed by the sulphuretted hydrogen, and the sulphuret of lead is precipitated of a metallic lustre, it is of the same nature as GALENA—the most abundant ore from which the metal lead is derived, being composed of,

1 atom or equivalent of Lead, 104
1 ditto. Sulphur, 16

120 atomic weight.

52. **LEAD,**—ATOMIC WEIGHT, 104—is a well known metal, rarely met with in nature in the metallic state; but the ore from which we derive our chief supply is the sulphuret of lead. Lead meets at 612 of Fahrenheit's Thermometer, and if the heat be considerably increased it will boil, and evaporate like water.

53. **LEAD MILK-PANS.**—In Lancashire the dairies are furnished with Milk-dishes made of lead. It is said that *leaden* milk-pans through up the cream much better than vessels of any other kind.

54. TO MANUFACTURE INSTANTANEOUS PHOSPHURET OF LIME FIRE BOTTLES.—Into the required number of small phials put a bit of phosphorous, the size of a pea each, and fill up with quick-lime; —set them in a frying-pan, full of sand, and put it over the fire; then with a stick mix the ingredients together, by stirring them about, but be careful too much air does not enter, which would set fire to and cause the destruction of the whole contents. But in order to prevent such an accident, put around the wire a piece of buff leather, the upper part thereof may be tied with waxed thread, whilst the lower part should be spread out so as to cover the neck of the bottle. When the mixture appears of a deep yellow colour, it is done enough, you must then hand off your phials (*one by one*) as this appearance takes place, and let them be immediately well corked. When a light is required, uncork the bottle, and introduce a small brimstone match, twisting it about two-three times between the fingers and thumb, draw forth the match, and it will instantly catch fire. Remember always to cork the bottle as soon as the match comes out, or the contents will catch fire. The expense of such *fire-bottles* will be about *One Sovereign* for a hundred.

55. TO MAKE PHOSPHURET OF SULPHUR FIRE BOTTLES.—Add one part of *sulphur* to eight parts of phosphorous, and let them be prepared in the same manner as Experiment 54, the only difference between this fire-bottle and the last, is the substitution of *sulphur*

for *lime*, with the following difference in the using;—the brimstone match took fire instantly on being drawn from the phosphuret of lime fire-bottle, whereas here, it must be rubbed on a bit of cork, and you shall presently obtain a light.

56. THE PHOSPHORIC PENCIL.—Take a small bit of Phosphorus, put it into a quill, and keep it in a phial of water;—this is the phosphoric pencil, when you write with it, dip it often in water to prevent its catching fire. This writing is visible in the dark, and invisible in the light.

Note. In handling phosphorus take care no small bits of it get below the nails of your fingers, as if they catch fire there they make severe burns; when phosphorus is cut, it ought always to be done below water, and all danger will be avoided.

57. A GOOD RED INK.—Boil a quarter of a pound of the best Brazilwood, with an ounce of powdered Alum, and the same quantity of Cream of Tartar, in one pint of water, and while the preparation is yet warm, dissolve an ounce of good Gum Arabic, and half an ounce of Sugar in it.

58. CARBON.—CHARCOAL.—A simple substance; Atomic equivalent, 6, is of a non-metallic nature, and is both inflammable and acidifiable—fixed and infusible—and is one of the most important elements in nature, it may be said to form the basis of the whole organic creation, it is insoluble in water, and the most intense heat will not fuse it, it has a powerful affinity for oxygen gas, and combined with it, forms carbonic acid; as also carburetted hydrogen, such as cities are now lighted with, all animal and vegetable oils, are almost entirely composed of this gas and *hydrogen;* their difference in their properties consist principally in the variation of these two bodies.

59. TO PREPARE CHARCOAL.—Put pieces of wood into a crucible, cover it with sand, and expose it to a very intense heat for about an hour. It is prepared in the large way, in cast-iron cylinders; during the distillation of Wood Acid, (vinegar).

60. CARBONIC ACID:—Electro-positive—Atomic equivalent 22.— it is composed of one atom carbon 6, and two atoms oxygen at 8, which is 16 of oxygen; (and 6 of carbon, and 16 of oxygen) is 22 as above—it exists in abundance ready formed in nature,—limestone, chalk, and marble, contain forty-four per cent. of it, and it may be very readily obtained from any of these substances, as almost every other acid has a superior affinity for the base of these stones. Carbonic Acid is obtained in the state of gas;—It is capable of being absorbed or condensed in water, (see 74) it extinguishes flame, (see 62). It is much heavier than atmospheric air, Miners call it the *choke-damp:* it is given out during the fermentation of Porter, Ale, Beer, Wort, and Ginger Beer, it is to this gas they owe their effervesing or frothing property. It has a peculiar sharp taste, *witness Soda Water:* The Salts of this acid are called *carbonates.*

61. TO PROCURE CARBONIC-ACID GAS.—Put into the Flask connected with the Pneumatic Trough (1) one ounce or two of chalk or marble powdered, then pour upon it four ounces of water, and afterwards gradually pour in two ounces of muriatic acid (*spirit of salt*). A violent effervesence will be produced from the disengagement of carbonic acid gas, which may be collected over water in the receiver as shown in the figure 1. *Observation.*—Muriatic Acid has a greater affinity for lime than carbonic acid; therefore, the muriatic acid enters into combination with the lime, (*forming the muriate of lime*) whilst the carbonic acid is liberated in the form of gas, and is caught in the receiver.

62. TO SHOW THAT CARBONIC ACID EXTINGUISHES COMBUSTION.—Take a jar filled with this gas, and hold it with its mouth upwards, then let down a lighted taper or candle into it, it will be extinguished in an instant.

63. TO SHEW THE GREAT WEIGHT OF CARBONIC ACID GAS.—Procure two jars of equal size, and fill one with carbonic acid gas, the other with common air.—Put a lighted candle into each, to prove that the one contains carbonic acid gas, and the other common air, again hold the mouth of that containing the carbonic acid perpendicularly over the other, as if pouring water into it; then let down a burning candle into each, and it will now be extinguished in the one which before contained the atmospherical air, and burn in the one which contained the carbonic acid. This operation of pouring it from the one jar into the other may be continued for a considerable length of time. *Observation.* —The reason of this gas being so easily transferred from one vessel to another. is its great weight compared with atmospherical air. This is also the reason that it is often found at the bottom of deep wells and mines, when the upper parts are entirely free from it. In these situations it is often fatal to persons who descend into those places.

64. CARBONIC ACID GAS PRECIPITATES LIME FROM LIME-WATER, and although perfectly transparent, on the contact of this gas it will instantly turn milky. *Observation.*—Carbonic Acid Gas is one of the readdiest tests, for detecting the presence of lime—and lime-water is also a ready test for discovering the presence of carbonic acid in water.

65. CARBONIC ACID GAS, PRODUCED DURING RESPIRATION.—Take a small animal, say a mouse, and confine it in a jar over lime-water, and in a short time the lime-water will become quite milky, or take the shank of a tobacco-pipe (or better, a glass tube) and breath through it, having its lower end immersed in the liquid, and the same effect will be produced. *Observation.*—The carbonic acid gas, from the lungs in either case, enters into combination with the lime suspended in solution in the water, and forms solid carbonate of lime.

66. TO SHEW AN ACID IS GIVEN OUT IN RESPIRATION.—Tinge a little water blue with red cabbage blades, then blow into this water as above (65). The blue colour will soon be changed to red. This

proves that the air expired contained *an acid—Now what acid was it?*

67. To prove that Carbonic Acid is given out in Respiration.—Warm the product of experiment 66—the red colour will disappear and the blue colour will be restored—this proves the acid to be volatile, and as it wants smell, it cannot be sulphuretted hydrogen (*which smells like rotten eggs*) it must therefore be carbonic acid, which may be proven by the formation of carbonate of lime, (experiment 64).

68. The Chemical Miracle!—or, Two Limpid Liquids converted by mere mixture into an opaque and solid mass.—Take the residuum of experiment 61, (muriate of lime) and add to it a saturated solution of carbonate of Potass, (both transparent liquids) the result is an opaque and almost solid mass. *Observation.*—The solutions are mutually decomposed—the muriatic acid (of the *muriate of lime*) leaves the lime and combines with the potass, of the carbonate of potass—while the carbonic acid of the carbonate of potass, leaves the potass to combine with the lime, and forms the *carbonate of lime,* thus instead of muriate of lime and carbonate of potass, we have now got *muriate of potass* and the *carbonate of lime*—and the carbonate of lime absorbs, and requires, all the water of the two preceding compounds to sustain its chemical combination.

69. ANOTHER CHEMICAL MIRACLE.—Take of the saturated solution of muriate of lime, (61) and drop into it sulphuric acid, and an opaque mass will be now formed. *Observation.*—The affinity of the sulphuric acid is greater for lime than muriatic acid, therefore, the sulphuric acid drives away the muriatic acid, and combines with the lime, forming solid *sulphate of lime—Paris Plaster*—a highly insoluble chemical compound.

70. ANOTHER CHEMICAL MIRACLE.—Pour a saturated solution of caustic potass into a saturated solution of sulphate of magnesia (*Epsom Salts*)—a nearly solid mass is again produced. *Observation.*—The sulphuric acid (*oil of vitriol*) leaves the magnesia of the Epsom Salts to combine with the potass, forming the sulphate of potass—whilst the magnesia is precipitated in the form of a white powder.

71. An Opaque solid restored to Transparency.—Take the opaque mass, (formed experiment 68) and add to it a few drops nitric acid,—the solid mass will be transformed into a transparent liquid, and the nitrate of lime is formed in place of the carbonate.

72. To ascertain if Water contain Pure Lime.—Into a glass of water, drop a crystal or two of oxalic acid; if a precipitate is formed, and if air, blown from the lungs through a glass tube into some of the same water in another glass, become milky, the presence of pure lime or barytes may be inferred—barytes has never yet been found in pure water.

73. To ascertain if water contain Carbonic Acid.—Take a little of the water and add to it an equal quantity of perfectly trans-

parent lime-water, if carbonic acid be present, a precipitate immediately appears.

74. TO MAKE GINGER BEER.—To every gallon of spring water, add two ounces of sliced ginger, one pound of common loaf sugar; and boil it near an hour, take off the scum; then run it through a hair sieve into a tub, and when cooled to the heat of warm milk, add yeast in the proportion of half a pint to nine gallons; stir six or eight times; then put it into a cask, which must be kept full, and the yeast taken off at the bung hole with a spoon. In a fortnight add half a pint of fining (isinglass picked and steeped in beer) to nine gallons, which will, if it has been properly fermented, clear it by ascent. The cask must be kept full, and the rising particles taken off at the bung hole. When fine (which may be expected in twenty-four hours) bottle it, cork it well, and in summer it will be ripe, and fit to drink in a fortnight.

75. TO MAKE GOOD SPRUCE BEER.—This wholesome liquor is thus made:—Take of water sixteen gallons, and boil the half of it; put the water thus boiled, while in full heat, to the reserved cold part, which should be previously put into a barrel or other vessel; then add sixteen pounds of treacle or molasses, with a few table spoonfuls of the essence of spruce, stirring the whole well together; add half a pint of yeast, and keep it in a temperate situation, with the bung-hole open, for two days, till the fermentation be adapted; then close it up, or bottle it off, and it will be fit to drink in a few days afterwards. In North America, and perhaps in other countries, where the black and white spruce firs abound, instead of adding the essence of the spruce at the same time with the molasses, they make a decoction of the leaves and small branches of these trees, and find the liquor equally good.

It is a powerful anti-scorbutic, and has proven very useful in long sea voyages.

76. TO MAKE YEAST OR BARM.—Mix two quarts of soft water with wheat flour, to the consistence of thick gruel or paste; boil it gently for half an hour, and when almost cold, stir into it half a pound of sugar, and four spoonfuls of good yeast. Put it into a large jug, or earthen vessel with a narrow top, and place it before the fire, so that it may, by a moderate heat, ferment. The same quantity as of common yeast will suffice to bake or brew with. Four spoonfuls of this will make a fresh quantity as before.

77. TO MAKE INSTANTANEOUS GINGER BEER.—Fill a beer bottle, with pure cold water, then have a cork ready to fit it, also a string or wire to tye it down with, and a cork mallet to drive the cork, so that no time may be lost; now, put into the bottle sugar to your taste, (syrup is better) and a tea-spoonful of good powdered ginger, shake all well, then add the sixth part of an ounce of tartaric acid, and one-fifth of an ounce of the super-carbonate of soda;—cork rapidly and tie down—shake the bottle well—cut the string—the cork will fly—then drink *Ginger Beer.*

Note. By increasing or lessening the proportions of the ingredients, you may suit your taste.

Dr. Stuart's medical tract, No. 11

Being No. 3, of the

CHEMICAL EXPERIMENTALIST.

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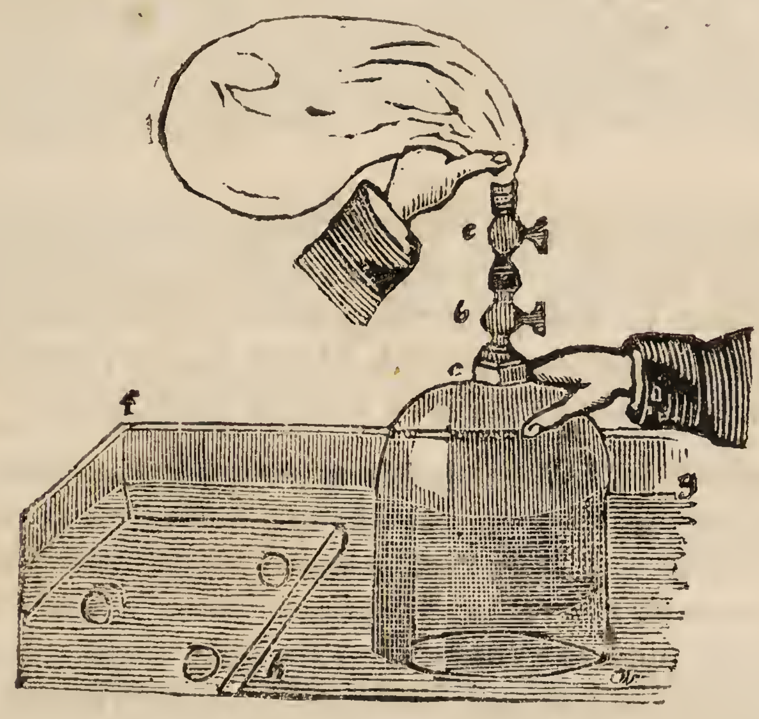
78. GAS TRANSFER APPARATUS.



79. TO MAKE INSTANTANEOUS SPRUCE BEER.—Proceed as in last experiment, but instead of powdered ginger, add a solution of essence of spruce, and spruce beer will be formed.

80. TO MAKE SODA WATER.—Fill a Soda Water bottle with pure water, and add of tartaric acid 35 grains, and of super-carbonate of soda 40 grains, cork quickly and soda water is formed.

81. TO MAKE SODA POWDERS.—Divide an ounce of tartaric acid into 16 powders, and an ounce of super-carbonate of soda into 14 powders, put the soda into blue papers, and the acid into white; when a blue and white papered powder will at any time form a draught of soda water, by dissolving them in two-gills of pure water.

82. TO MAKE SEIDLITZ POWDERS.—Proceed the same as 81, with a tea-spoonful of Rochell-Salts added to the paper containing the soda.

83. TO MAKE GINGER BEER POWDERS.—The same as 81, with a little powdered ginger and loaf sugar added.

84. LEMONADE POWDERS.—The same as 81, with a little sugar, and a few drops of essense of lemon added to the acid powder.

85. GROUND-IVY IN ALE.—The leaves of ground-ivy thrown into the vat with the ale, clarify it, and give it an anti-scorbutic quality.

86. TO MAKE EXCELLENT TABLE BEER.—To two gallons, (eight quarts) of boiling water, put a pound of treacle, a quarter of an ounce of ginger, and two bay leaves, let this boil for a quarter of an hour, then let it cool to the heat of warm new milk, then add yeast and work it the same as other beer.

87. TO MAKE PORTER.—Take eight bushels of malt to the hogshead, and eight pounds of hops; put all into a copper, with three pounds of spanish liquorice bruised, while boiling, add also a pound of spanish juice, and twelve pounds of treacle, add yeast and work off.

88. TO RESTORE ALE OR PORTER THAT HAS TURNED SOUR OR FLAT.—Put into the bottom of an earthenware jug, a small portion of the super-carbonate of soda, (corresponding to the taint of the liquor) and pour upon it the sour or flat Ale or Porter, and immediately it will be restored to its sweet and wonted briskness.

89. CARBONIC ACID holds a pre-eminent rank in the formation and changes in many of the above processes.—In all the preceding, tartaric acid and super-carbonate of soda compounds; the tartaric acid, entered into combination with the soda of the super-carbonate, and formed the *tartarate of soda*, whilst the carbonic acid was set at liberty as gas and produced the effervessing we witnessed.

In hard or sour Ale, the acetic acid of the ale joins the soda, and carbonic acid is set free.

90. TO MAKE SMELLING SALTS.—Take a small piece of burnt unslaked lime, say an ounce and a half, and add to it in a mortar, one ounce of muriate of ammonia, *(sal ammoniac)* rub them well together, and you will perceive the pungent smell of ammoniacal gas. *Observation.*—The muriatic acid *(Spirit of Salt)* of the sal-ammoniac has a greater affinity for lime than ammonia, it therefore leaves the ammonia, and combines with the lime, forming the muriate of lime, whilst the ammoniacal gas is set at liberty.

91. VOLATILE SALT SCENT BOTTLES.—Fill small wide mouthed phials with the above preparation, (90) and add a drop or two of essence of lemons to each, thus superior scent bottles will be formed; the ingredients of a hundred of them would not cost two shillings, and at the same time superior to the most that are made.

92. TO MAKE WATER OF AMMONIA—HARTSHORN—Into a retort, put some quicklime broken small, along with muriate of ammonia, let the beak of the retort be immersed in water, and apply a lamp below the retort; the ammoniacal gas will be given out, and passing into the receiver nearly full of water, it will be absorbed by the water, forming water of ammonia, (hartshorn).

93. NEW WAY TO DESTROY BEES.—In a vessel, containing about two inches of water on its bottom, set the Hive upon three bricks, then invert a washing tub without handles over it, and beneath the edge of the tub let carbonic acid gas be introduced and in a few seconds all will be still; or invert the Hive, and let the end of the retort convey the gas into the floor which is uppermost, the gas from its heavines will soon fill the Hive and make all motionless within.

94. TO MAKE BENGAL LIGHTS.—Take of Nitrate of Potass, *(saltpetre)* eight parts; sublimed Sulphur, four parts; Antimony, one part; let all be powdered and well mixed, then beat it firm into a cup, can, or mould, and set fire to it, it gives a most intense and luminous light.

Note. A little camphor added gives still greater brilliancy, such lights are made use of as signals by mariners at sea, when communicating with the shore, or vessels at a distance, during night.

95. THUNDER POWDER.—Take of Nitre, (saltpetre) three parts; pearl ashes, two parts; and of sulphur, one part; let these ingredients be well mixed in a mortar, and preserved in a well corked phial. About 60 grains of it held over a candle in a metal spoon, or over the fire in an iron shovel, will explode with a report loud as a cannon.

96. TO PRESERVE BEEF AND MUTTON.—As soon as the meat is cold, it must be cut up in quarters, and sprinkled with the following ingredients; lignum vitæ, in fine chips, one pound; common salt, four ounces; coarse sugar, four ounces; salt prunella, half an ounce; when it has been well sprinkled in, close the whole in sheet lead, lay it in a chest, and fill it with fresh saw-dust. Meat so prepared, has been kept two months in the finest order. When taken out to be dressed, it should be wiped and scraped clean, and roasted as quickly as possible.

97. CHARCOAL FOR SWEETENING THE BREATH, CLEANING THE TEETH &c.—Rubbing the teeth, and washing out the mouth, with fine charcoal powder every meal will render the teeth beautifully white, and the breath perfectly sweet, more especially where an offensive breath has been owing to a scorbutic disposition of the gums.

98. TO SWEETEN MEAT OR FISH THAT IS TAINTED.—When meat or fish, from intense heat or long keeping, are likely to pass into a state of corruption, a simple mode of keeping either sound and healthful is by putting a few pieces of charcoal into a pot or saucepan, wherein the fish or flesh is to be boiled. Among others, an experiment of this kind was tried upon a turbot, which appeared too far gone to be eatable: the cook, as advised, put three or four pieces of charcoal, each the size of an egg, under the strainer in the fish kettle: after boiling the proper time, the turbot came to the table perfectly sweet and firm.

99. TO CURE TAINTED FISH.—Tainted fish may be again restored to its proper flavour, by mixing a quantity of vinegar and salt in the water in which the fish is to be boiled.

100. To prevent Water and Meat from putrefaction in long voyages.—The crews of two Russian ships, that lately sailed round the world, were extremely healthy. And during the whole three years of their voyage, only two men of the crew of the Neva died, and the Neveshda did not lose a single man. It is already known that their fresh water was preserved in charred casks; but it is not generally known that they used the same precaution for their salted provisions. The beef they carried out with them, tasted as pleasantly upon their return, as it did three years before, when first salted.

101. MURIATE OF SODA, (COMMON SALT)—is a natural compound of Muriatic Acid and Soda.

102. SODA—is the metal *Sodium*, in combination with one atom of *Oxygen*, (in fact the metal Sodium oxidated or in the state of *Rust).*

103. MURIATIC ACID, (SPIRIT OF SALT)—is a compound of one atom Chlorine, or greenish-yellow gas, with one atom of Hydrogen gas, (4)—therefore, Muriate of Soda (*Common Salt*) is a compound of the metal Sodium, Oxygen Gas, Hydrogen Gas, and Chlorine Gas.

104. MANGANESE—a metal having much the same appearance as cast-iron, and combined with oxygen, it is known by the name of the *black oxide of manganese.*

105. CHLORINE—Atomic Equivalent, 36, Electro-Negative—is eminently destructive of animal life,—it is even dangerous to breath it, though largely diluted with common air. That eminent French Chemist, Mr. Pelletier, lost his life by inhaling a quantity of chlorine gas; and a young man, Mr. Roe of Kingsend, near Dublin, died after a very short illness, in consequence of his having also inspired a portion of it too freely: I need therefore hardly say, *be careful.* It has an astringent taste and a very suffocating smell.

106. TO PROCURE CHLORINE GAS.—Mix three ounces of powdered manganese, with eight ounces of common salt, put this mixture into a retort, and pour on it six ounces of sulphuric acid, previously mixed with an equal quantity of water,—apply a gentle heat, and the gas will be produced in great quantities.

Observation.—The sulphuric acid combines with the soda of the common salt, forming the sulphate of soda, (glaubers salts) whilst the muriatic acid is set free, and one atom of the oxygen of the per oxide of manganese is again united to the hydrogen of the muriatic acid, (103) to form water, whilst the chlorine is left alone, and passes off to the receiver in its natural form—*gas.*

107. To procure Bleaching Gas, (Chlorine) by a simple process.—Put into a retort one ounce of finely powdered per oxide of

manganese, (*black oxide*) and pour upon it two and a half ounces of muriatic acid, and apply heat as before,—the gas will be set at liberty. *Observation.*—Muriatic Acid is a compound of one atom of chlorine, and one atom hydrogen, (103) and in this case by the aid of a gentle heat, one atom of oxygen leaves the manganese, and enters into combination with the one atom of hydrogen of the muriatic acid, and forms water, whilst the chlorine gas is set at liberty as before.

108. LIQUID CHLORINE—BLEACHING LIQUOR—is prepared by agitating chlorine gas, with cold water, it possesses the property of destroying all vegetable colours.

109. TO SHEW THAT CHLORINE SUPPORTS COMBUSTION.—Take a lighted candle, and immerse it into a jar of this gas, it will burn with a red flame, and emit copious dense fumes.

110. SPONTANEOUS INFLAMATION OF METALS BY MEANS OF CHLORINE GAS.—Take a piece of tin-foil, copper-leaf, or powdered antimony, and drop them into a jar of this gas, and inflamation will momentarily ensue.

111. CHARCOAL DUST AND PHOSPHOROUS INFLAME, AND BURN WITH SPLENDOUR IN CHLORINE GAS.—Let down, into a vessel of this gas, in a small metal cup attached to a wire, a piece of phosphorous about the size of a pea, it will immediately inflame and burn with great brilliancy; charcoal dust, dropt in as in last experiment, will also inflame during its descent. Introduce a few leaves of gold, or silver, into a jar or bottle of chlorine gas, and they will take fire spontaneously, and burn till they are entirely consumed. *Observation.*—Almost every metal, in a state of minute division, takes fire, and burns spontaneously in this gas. Iron, zinc, copper, &c. must be introduced in a state of filings. Antimony burns with a brilliant white flame; arsenic with a green; bismuth with a blue; zinc with a white; tin with a bluish-white; lead with a clear-white; copper with a red; and iron with a bright-red flame.

112. TO WHITEN BONES BY MEANS OF CHLORINE.—Steep the bones in a weak solution of chlorine, (108) and when done enough let them be washed afterwards in water sharply acidulated with sulphuric acid.

Note. Bones whitened by this means become as white as Ivory.

113. TO SHOW THAT CHLORINE GAS DESTROYS ALL VEGETABLE COLOURS.—Fill a jar with chlorine gas, and while standing on the shelf of the pneumatic trough, take a piece of coloured cloth, or blue paper, and introduce it into the jar through the water, and in half a minute the colour of it will be completely discharged.

Observation.—From the great power which this gas has in discharging colour, it is now very much employed in the bleaching of cloth and yarn.—Water impregnated with this gas has a similar effect in discharging colour.

114. To prepare a Bleaching Liquid, (Chloride of Lime.—Mix two parts of common salt with one of the black oxide of manganese, put this mixture into a retort, the end of which is closely fitted to a receiver previously filled with lime-water, then pour into the retort one part of sulphuric acid, which has been diluted with an equal quantity of water, and allowed to cool. Chlorine gas will immediately be evolved and absorbed by the liquid in the receiver, which must be kept constantly agitated during the formation of the gas. By this means the lime will be completely dissolved, and a transparent solution of chloride of lime will be formed, possessing the power of discharging colour in a very eminent degree.

Observation.—Potash, or Magnesia, may also be used instead of lime, but they are more expensive, and therefore are not so much employed.

115. To Bleach Linen Cloth or Yarn by means of Chloride of Lime.—Steep the cloth or yarn for twenty-four hours in a weak solution of potash, at a blood heat, then wash it in running water, and boil it for two hours with pearl-ashes and soap; then remove it, and after being well washed in cold water, steep it for ten or twelve hours in the bleaching liquid (prepared by experiment 114) after diluting it with water till its specific gravity be a little more than that of water; it is then to be passed through water containing as much sulphuric acid as will give the water the taste of vinegar. After this, it is to be well washed in clear water; it will then be perfectly white and pure. *Observation.*—This is the modern process of bleaching linen goods on a large scale, and is found both cheap and expeditious.

116. To Bleach Cotton Cloth for Calico Printing.—Steep the cloth in alkaline ley for ten or twelve hours, then wash it, and boil it five or six times with pearl ashes, allowing about four ounces to twenty-one yards of cloth. Between each boiling the cloth must be washed and exposed for a few days on a bleaching green, and passed through water, slightly acidulated with sulphuric acid, then well washed in clear water, and afterwards dried.

117. TO BLEACH MUSLIN.—After steeping the muslin, and washing it well in clear water, boil it with a weak solution of pearl-ashes; wash it again, and boil it twice or three times in soap, then pass it through water acidulated with sulphuric acid; boil it once more with soap, then wash it, and afterwards immerse it for a few minutes in the bleaching liquid (chloride of lime); it is then to be passed through water acidulated with sulphuric acid, and afterwards washed and dried. Note. The boiling and steeping in the chlorine, or bleaching liquid, must be repeated till the muslin is clear.

118. To prepare that interesting Salt, Chlorate of Potass.—Grind in a mortar one part of the black oxide of manganese, and then introduce it into a retort, add to it two parts of muriatic acid, (spirit of salt) and the chlorine will be given out; let this gas be received into a vessel containing a saturated solution of potass,—*(as much potass as water will dissolve)*—the gas as it passes into

the solution of potass will be rapidly absorbed; when it is saturated, *(will absorb no more)* set it aside in a cool dark place, and a deposition of brilliant crystalline scales of *chlorate of potass* will be the product, which may be taken out, dried, and kept in a well stopt bottle for sale or use.

119. THE ART OF BLEACHING ILLUSTRATED.—Put into a bottle containing liquid chlorine, (108) a few stripes of cloth, dyed with different vegetable colours, and these colours will be almost instantly discharged.

Note. It is necessary that the articles to be bleached be moist with water, in order that the colour may be well discharged.

120. METHOD OF BLEACHING STRAW BY MEANS OF CHLORINE.—Dip the straw in a solution of chlorate of potass, (118) or chloride of lime (114) which is much cheaper. The straw will thus be rendered white, and its flexibility (it is said) will be greatly increased.

121. TO DISCHARGE COLOUR FROM INK.—To common ink add a few drops of muriatic acid, (spirit of salt) the black colour will then disappear, and the liquid will become transparent.

122. TO REMOVE SPOTS OF INK FROM PAPER OR CLOTH.—Put a little muriatic acid into a tea-cup, then put into it about ten times as much boiling water; wet the spot or spots repeatedly with this liquid, and afterwards immerse it in water, then wash and the spot will be discharged. *Observation.*—The vegetable acids (the acetic, oxalic, or citric) may be used with less risk, and will often have the same effect in removing the stain.

123. ANOTHER WAY TO PREPARE CHLORINE FOR DISCHARGING COLOURS.—Put half an ounce of the red oxide of lead (red lead) into a phial, and add to it about two ounces of muriatic acid; then set it in a dark place, and in a few hours the red lead will be converted to white lead, and the liquid to chlorine, *(liquid chlorine* 108*)*.

Observation. —The experiment must be performed in the same manner as here described, and the chlorine kept in the dark, because light has the effect of decomposing it, by converting it into muriatic acid.

124. TO TAKE OUT WRITING OR INK STAINS FROM THE LEAVES OF PRINTED BOOKS, WITHOUT INJURING THE PRINT.—Moisten the writing or stain with the chlorine, (which was prepared by last experiment, 123) by means of a feather, or hair pencil, and in a short time it will completely disappear. *Observation.*—There is no danger of injuring the print, as chlorine has no effect on any ink which contains oil, which printers' ink does.

125. TO DISCHARGE THE COLOUR FROM PRINTED GOODS.—Take a piece of printed calico, or coloured ribbon, and boil it for a short time in a weak solution of pure potash, then wash it in distilled water, and hold it, while in a moist state, over a basin, in which a little muriatic acid has been poured upon a tea-spoonful of the

black oxide of manganese, and in a few seconds the colour will be completely removed. *Observation.*—The latter part of this experiment should be performed out of doors, or at least great care should be taken that as little as possible of the gas escape into the room, as its action on the lungs is extremely irritating and injurious, (see 105).

126. To Discharge the Colour of Indigo.—Into a wine-glass pour a little of the solution of the acetate of indigo, (indigo combined with vinegar) and then add to it a few drops of chlorine, and the colour will immediately disappear. *Observation 1st.*—The colour of cloth dyed with indigo may also be discharged by chlorine. *2nd.*—The colour of cochineal may be discharged by the same acid.

127.—To take out Iron Moulds from Linen.—Rub the iron mould over with sulphuret of potash, and then bathe it well in citric acid, afterwards wash it in water, and it will be completely removed.

128. To Remove Fruit and Wine Stains from Cloth.—Pour a little chlorine into a cup or wine-glass, and dilute it with three or four times its bulk of water, then steep the stained part of the cloth in it till it be discharged.

129. Instantaneous formation of a Bleaching Liquid.—To one ounce of muriatic acid diluted with as much water; add a few grains of chlorate of Potass, (118) and the liquid thus formed will possess the bleaching properties described. (113).

130. To Bleach Bees' Wax by Chlorine.—In bleaching bees' wax the following is the process, as it is usually conducted in England. Common bees' wax is melted upon hot water; and when in a fluid state, it is laded out of the copper, together with a part of the water, into a wooden vessel, and in this it is allowed to remain a few hours for the impurities to subside. While still hot, the purified wax is put into a cullender full of holes, through which it runs, and falls upon a revolving metallic roller, which dips into cold water contained in a vessel placed underneath. As the melted wax runs through the cullender upon the revolving roller, the motion of the cylinder forms it into thin shavings, which cool as they come in contact with the water, and fall in an accumulated heap into the water below. These shavings of wax being now in a suitable form for absorbing oxygen, are taken out of the tub, and exposed in a field to the action of the atmosphere till they become sufficiently white;—but a quicker method is to allow the melted wax which runs through the cullender upon the revolving cylinder, to fall into the bleaching liquid, (108) instead of the water, and the wax will be beautiful and white; then for the last time melt it in a kettle, and cast it with a ladle on a table, out of which is cut numerous little round hollows the size of cakes of white wax, wet these moulds with water, that the cakes may be the easier got out; lastly, lay them out in the air for two days and nights, to make them more transparent and dry.

Dr. Stuart's medical tract, No. 12

Being No. 4, of the

CHEMICAL EXPERIMENTALIST.

131. BREATHING INTOXICATING GAS.

132. TO PRODUCE BY MEANS OF CHLORINE A TERRIBLY EXPLOSIVE COMPOUND.—Fill a small jar with chlorine, and transfer it into a bason, containing a solution of nitrate of ammonia, a little warmed. The gas will slowly become condensed, and the liquor will rise up in the jar, and presently an *oily liquid* forms on its surface.

This increases and collects into small globules, and falls through the liquid, and forms a terribly explosive compound; much danger exists in the means of gathering it together, many accidents have occurred of a frightful nature, substances most similar in their nature being affected very differently towards the oil: charcoal of wood seems uniformly innocent in *tact* with it, and therefore offers one of the safest vehicles for removing it. In olive oil, for example, a quantity the size of a pin's head will explode violently and loud, knocking the vessel in which it takes place to atoms.

Seeing that so much danger is connected with this curious substance, the precaution of wearing a mask with eye-glasses, while experimenting with it, and perhaps a pair of gloves, must be evidently necessary.

133. DETONATING POWDER.—To three grains of finely levigated chlorate of potash, add two grains of sulphur: mix them well, in a clean dry mortar, then collect them together at its bottom, and with the pestle, press the powder hard, by bringing it down at the *sides* of the mortar suddenly, whereby friction against its *bottom* takes place. A loud detonation ensues, with a vivid flash. But if the pestle be turned briskly round, as is usual with druggists, after some time pounding any substance, repeated small reports will take place, attended with vivid flashes, not unlike what we see and hear in the electric shock. It is here worthy of remark, that if less sulphur be used, less friction is necessary to produce the several reports. By being struck with a hammer, its noise is equal to that of a horse pistol.

134. EXHIBITION OF THE POWERFUL DETONATING PROPERTIES OF INFLAMMABLE BODIES WITH THE CHLORATE OF POTASS.—It is necessary in all these experiments with chlorine, and the chlorate of potass, to proceed with small quantities, and great caution—letting your hands be covered, and always keep the face as far as possible from the vessels containing the mixture.

135. TO PREPARE THE SECOND EXPLOSIVE COMPOUND.—To one grain of powdered chlorate of potass, in a mortar, add about half a grain of phosphorous; when these are rubbed together, a violent detonation will immediately ensue, accompanied with flame.

Observation.—In making this experiment, the hand should be covered with a glove, and care taken that none of the inflamed phosphorous fly into the eyes.

136. TO PREPARE THE THIRD DETONATING COMPOUND, WHICH BURNS LIKE LIGHTNING.—Take a small quantity of metallic arsenic, and mix it gently on a piece of paper, with nearly an equal quantity of chlorate of potass. If a small quantity of this mixture be formed into a long train, on a table, and then set on fire, it will burn with the rapidity of lightning. *Observation.*—The rapidity of the combustion of this mixture far exceeds that of gunpowder, as may be shewn by making a train of each, and placing them in contact at one end, so that they may be fired together.

137. TO PREPARE THE FOURTH EXPLOSIVE COMPOUND.—Fill a bottle, of the capacity of three or four pints, with pure chlorine gas, taking care to expel the water as completely as possible; then throw about a dram of good sulphuric ether into it, and immediately cover its mouth with a piece of light wood or paper. In a few seconds, a white vapour will be seen moving circularly in the bottle; this appearance will soon be followed by an explosion, accompanied with flame.

138. Fifth Explosive Compound.—Wrap two parts of chlorate of potass with one of sulphur into a piece of strong paper or tin-foil, strike it smartly with a hammer, and an astonishing report will be produced.

139. Sixth,—An eminently Inflammable Compound.—Rub four grains of the chlorate of potass down to a fine powder, mix it with two grains of charcoal, also finely powdered, and about one grain of sulphur, let all be intimately mixed on a piece of paper by trituration, it will burst into flame without much noise.

140. Seventh,—Sudden and Vehement Inflammation.—Mix four grains of the chlorate with as much loaf-sugar, both previously reduced to a fine powder, fasten a string to the end of a stick, and dip it in strong sulphuric acid—touch the mixed powder with the end of the string and immediate inflammation will take place.

141. To make instantaneous Light Matches.—Take one drachm of chlorate of potass, one and a half drachms of sugar, rub them together, and add a small quantity of vermillion to colour, make it fluid by a little volatile alkali, then take brimstone matches and dip in the mixture, let them dry, and these are the matches.—When you wish to fire the match, dip it in a small phial of sulphuric acid, (oil of vitriol) and it will immediately inflame.

Note. To preserve the acid, add to it a small piece of asbestos.

142. TO MAKE LUCIFER MATCHES.—Wet the points of slips of card, or small spunks of inflammable wood (say Norway fir) with gum water; then mix two parts of chlorate of potass with one part of sulphur, blackened with charcoal or reddened with vermillion, and dip the wet ends of the cards or matches into this mixture, let the whole dry; these matches drawn smartly through glass or emery paper, will inflame immediately.

143. To destroy Bugs by means of Chloride of Lime.—Take a quantity of the chloride of lime, and make it into a paste with churned milk; with this paste fill up all the crinks and seams, afterwards thin it rather more with the milk, and white-wash the whole with it.

144. A Choice Secret for Cabinet-Makers—To Imitate Ebony Wood—Take clean and smooth boxwood, boil it in oil until it turns black, then polish it with wax and an woollen rag.

145. THE ITALIAN CEMENT—A Choice Secret, for instantaneously mending Broken Glass or China, so as it may be used to hold water immediately, and be stronger than before it was broken.—Warm the broken edges of the vessel, whether it be glass or china, at a charcoal fire, or at any rate, where you have heat without much smoke, rub these edges with a piece of shell-lac, and fasten them quickly together, dip in cold water, and your vessel is whole.

146. FOR COMB-MAKERS—To Dye Horn a Blue Colour—Take a brass bowl, make it red-hot and wipe it over with muri-

ate of ammonia, then pour *lime-water* upon it, stir it, and you will have a blue water, in which steep the horn, the longer you let it lie, the deeper will be the colour.

147. HOW TO BEAUTIFY THE SKIN.—Take parsley, nettle-seed, peach kernels, of each an equal quantity, boil them in fair water; with which, wash your hands or face.

148. HOW TO DAPPLE A HORSE.—Take in the spring the large buds of young oak-trees, mix them among the horse's provender, and give it him three or four times to eat, and he will be dappled, and continue so for a whole year; the buds of young elm-trees will have the same effect.

149. LIQUOR DE JAVELLE—LYE OF JAVELLE—This liquid which is now sold in London in small bottles, under the name of bleaching liquid, for the use of private families, is found to be nothing more than a solution of chloride of potass (118) it has the property of bleaching cloth by a few hours' immersion.

150. A BEAUTIFUL VARNISH, WHICH MAKES ENGRAVINGS AND PRINTS RESEMBLE (EVEN EXCEL) OIL PAINTINGS IN APPEARANCE.—Take of Balsam of Canada, one ounce; and of spirit of Turpentine, two ounces; mix them well together, and this is the varnish.

151. MANNER OF USING CANADIAN VARNISH.—Prepare the print, engraving, or drawing, by washing it over with a solution of isinglass in water, and when dry, apply the above varnish with a hair brush; by repeating the coats, you may cause it to appear like glass.

Note. The effect will be greatly improved by previously mounting the print on a canvass or strainer.

152. TEST FOR TO DISCOVER WHETHER CLOTH BE INJURED IN THE BLEACHING.—On this account, (says Park in his Chemical Essays) it is desirable that the public should be acquainted with a test that would in every case shew whether the chemicals had been properly applied or not; or, in other words, whether the goods which an individual may be about to purchase, have or have not been impaired by the process of bleaching.

The makers of thread and cotton hose were so convinced of the importance of having a test of this kind, that some few years ago, the principal manufacturers adopted the practice of running a line of vat-blue thread dyed very dark, or of turkey-red, along the top of each stocking; and those bleachers only were employed by them who could render the hose beautifully white, without effacing the blue or red stripes, or even lessening their intensity of colour.

The chloride of lime will destroy indigo-blue or the turkey-red dye, if it be used of a considerable strength; and yet it may be so diluted, that it will be strong enough to bleach linen or cotton goods effectually, and still be incapable of injuring the colours above-mentioned. On this account it appears to me that these dyes will always afford excellent tests for ascertaining when the bleaching process has been properly or improperly conducted.

Great advantages might indeed accrue to the manufactures of this country if the makers of plain calicoes, dimities, hempen cloths, cambrics, and Irish linens, as well as the makers of cotton hose, would adopt the method of running a line of such coloured threads along one of the edges of their goods, before they send them to be bleached; and that they would employ no bleacher who would not engage to *preserve those colours entire,* and of their original perfection or intensity.

Were this to become a general practice, the public would soon learn the importance of purchasing no goods but such as contained that badge of strength and goodness, and the nation would be sure of preserving that superiority in the foreign market to which it has been accustomed, but which has lately been so much endangered by the uncertainty with which the modern practice of bleaching has been attended. Until something of this kind be established, no one can be certain of the quality of the goods he purchases. In buying linen and cotton hose, he may indeed, at present, avail himself of the precaution I have been recommending, as there are now white hose in abundance in the market which contain these kinds of coloured lines in perfection, and which shew that the goods have undergone the necessary ordeal, and have come forth from it uninjured. The design of this detail is to convince the public, that it would be to their advantage to demand that the same attention should be paid to the bleaching of every other kind of goods, whether they be manufactured of linen or cotton."

153. MOLASSES ALE.—Put one peck of barley or of oats into an oven, just after baking, or into a frying-pan, just to steam off the moisture, and dry it well but on no account to burn the grain then grind or bruise it roughly; boil 2½ gallons water, and when it has stood ten minutes (say at a heat of 175° or so hot as to pain the finger sharply) put in the grain; mash it well and let it stand three hours, then drain it off, boil two gallons more water, which pour on the grains, rather hotter than before, but not boiling, say 196°, and mash them well; let it stand two hours, and drain it off; mash the grains again well with two gallons cold water, and in one hour and a half drain it off—the three worts will be about five gallons, then mix seven pounds treacle, or five pounds of the darkest sugar, in five gallons of water, and boil the whole ten gallons with four ounces of hops, for one hour and a half—taking care to stir it so long as the hops float on the top; let it cool, and when about milk-warm, take a good tea-cupful of yeast, and stir it well together, beginning with about a gallon of wort at a time; let it ferment for eighteen hours in a tub covered with a sack, put it into a nine gallon cask, and keep it well filled; bung it up in three days, and in fourteen days it will be good sound fine beer, equal in strength to London Porter; the nine gallons of beer thus brewed will cost as follows—

1 peck barley,	1s.3d.
7 lbs. treacle,	1s.9d.
4 oz. hops, -	3d.

3s.3d. or 1d. per pot.

154. Receipt for Malt and Molasses Ale!!!—Boil eight gallons of water, and when it has stood ten minutes, (say 176, or so hot as to pain the fingers sharply) put into it one bushel of ground malt, mash it well, let it stand for three hours and draw it off—pour upon the grains eight gallons more of boiled water, rather hotter than before, but not boiling, (say 196) mash it, and let it stand two hours and draw it off; then mash the grains with eight gallons more of water, let it stand one and a half hours and draw it off. Mix twenty-eight pounds of treacle, or twenty pounds of the darkest sugar, in twenty gallons water, and boil the whole together with two pounds of hops, for two hours, stirring it so long as the hops float; let it cool, and when about milk-warm, mix about half a pint of yeast, by about two gallons at a time, and stir well; let it ferment for twenty-four hours in a vessel with a sack over it, then put it into a barrel, keep it filled up, bung it down in three days, and in three months you will have thirty-six gallons of good ale.

1 bushel malt,	9s.
28 lbs. treacle,	7s.
2 lbs. hops,	2s.
	18s. or 1½d. a pot.

Note. The only risk is from using the water *too hot,* which prevents the draining off, of the liquor, by setting of the grain—the dryed grain will drain better by being mixed with a handful of oat chaff or straw before the first water, it will prevent it from sitting. The hops will yield better if they are pretty well damped before they are mixed with the worts. Observe, never use boiling water to the grains.

155. NITRIC ACID—AQUAFORTIS—is composed of one atom Nitrogen Gas; and five atoms of Oxygen; it is a deadly poison, although composed of the very same ingredients as our atmosphere, but it is combined in different proportions—in the atmosphere, there is but one volume of oxygen gas to four volumes of Nitrogen—whereas, in *Nitric Acid,* there are two and a half volumes to oxygen, to one of Nitrogen Gas. It is of much use in the arts, and medicine, it is particularly useful in the dissolving of metals—by first parting with a part of its oxygen to oxidate them, and afterwards dissolving their oxides—The Salts of Nitric Acid are termed *Nitrates.*

156. AMMONIA—Volatile Alkali—Spirits of Hartshorn—is a compound of nitrogen and hydrogen gases, and these two gases in combination form *Ammoniacal Gas.* This gas has a pungent smell, extinguishes combustion, and destroys animal life; and, in common with the other alkalies, changes the blue colour of vegetables to green.

157. CARBONATE OF AMMONIA—Smelling Salts—is a solid salt composed of carbonic acid and ammoniacal gas, (156) its ultimate composition is therefore, carbon, *(charcoal)* oxygen, nitrogen, and hydrogen gases.

158. **NITRATE OF AMMONIA**—Inflammable Nitre.—This interesting salt is the product of the combination of carbonate of ammonia (157) with nitric acid (155), its taste is extremely cold and acrid; when thrown an a red-hot iron, it explodes with a loud noise, and is decomposed; the oxygen of the nitric acid unites to the hydrogen of the ammonia, to form water, and the nitrogen of both the nitric acid and ammonia is dissipated in the explosion.

159. To prepare Nitrate of Ammonia—for Intoxicating Gas.—Take any quantity of pure nitric acid, dilute it with thrice its weight of water, and put it into an open-mouthed glass vessel, then drop into it pieces of carbonate of ammonia (157), a violent effervessence will ensue—continue to drop in the carbonate of ammonia, so long as the effervessence succeeds; when it stops, set it past for a night, and in the morning you will have all your carbonate of ammonia converted into nitrate of ammonia—or *inflammable nitre.*—It is necessary to take the needlelike crystals of nitrate of ammonia, and dry them between folds of bibulous bloating paper—it will then be fit for making *Laughing Gas.*

Observation.—The nitric acid has a greater affinity for *ammonia* than *carbonic acid,* it therefore lays hold of the ammonia to form the nitrate of ammonia, while it expels the carbonic acid, which causes the effervessence, and so long as the effervessence continues, it shews that the nitric acid is combining with the ammonia.

160. **NITROUS OXIDE GAS**—is a compound of two parts of oxygen, and one part of nitrogen, gases, both of which gases constitute our atmosphere—only mixed in different proportions; there is just twice the quantity of oxygen to the nitrogen in intoxicating gas, as there is of oxygen to the nitrogen of atmospheric air; therefore, a very slight change in our atmosphere might produce this intoxicating gas. This gas of Paradise, as it has been called, whose taste is sweet, and to breath which, exhilerates the soul!

161. **PREPARATION OF LAUGHING GAS**; or, Nitrous Oxide.—Put a quantity of nitrate of ammonia (158) into a glass retort, apply a lamp whose heat must be gentle and well regulated, the salt will liquify, and must be kept gently simmering; the gas will be produced, and may be collected in a receiver over water, and conveyed from that into a bladder, (as seen 78) before it is conveyed from the receiver into the bladder; if intended for *breathing,* it ought to stand two or three hours, till it becomes perfectly transparent, before driving it up into the bladder.

162. **PROPERTIES OF NITROUS OXIDE GAS.**—A candle burns in it with a green flame, and gives out a crackling noise. It is heavier than common air. Phosphorous, charcoal, sulphur, and iron burn in it, and when mixed with oxygen it detonates.

163. The manner of Breathing Intoxicating Gas.—Put the *laughing gas,* (as prepared and purified experiment 161) into a large bladder or water-proof silk bag, having a wide glass tube affixed to its neck; then hold the bladder by the tube, in the right-

hand, keeping the thumb of the same hand upon the external mouth of the tube, (to prevent the escape of the *gas of Paradise*) then lay hold of your *nose* with the fore-finger and thumb of your left hand, and keep your nostrils close and firm, now expel as much air from your lungs as possible, by an extraordinary expiration, and instantly introduce the end of the tube of the bladder into your mouth, removing your thumb from its extremity at the same time, and breath the gas *from* and *into* the bladder as long as possible, which will be about three minutes, then shall sensations of the most agreeable nature be produce,—exquisite pleasure!—irresistable mirth—rapid flow of Paradicial Ideas—toes, fingers, and ears, thrilling agreeably like the vibrating cords of some musical instruments—propensity to laugh and dance—and, lastly, a strong inclination to *jump* over chairs and tables, feeling so light as almost to be under the necessity to mount and fly!

164. TO SHEW THAT NITROGEN GAS WILL NOT SUPPORT COMBUSTION.—Place a small piece of lighted candle in a small flat candlestick on the shelf of the pneumatic trough, and quickly place over it a jar of nitrogen gas, and the candle will be instantly extinguished.

Observation.—This gas immediately extinguishes any substance which is immersed in it in a state of combustion; even phosphorus in a state of active inflammation is extinguished almost instantaneously.—It is also fatal to animals that are confined in it.

165. TO SHEW THAT ATMOSPHERICAL AIR IS DIMINISHED IN BULK BY ANIMAL RESPIRATION.—Take a mouse, or other small animal, and confine it in a jar of air, then fasten a piece of moistened bladder over it. The heat of the animal will at first expand the air a little, and the bladder will appear somewhat convex outwards; but as soon as the animal dies and is become cold, the bladder will exhibit a hollow surface, which proves that the air in the jar has suffered a diminution.

Observation.—If this experiment be performed in a graduated jar, the amount of the diminution may be ascertained more correctly.

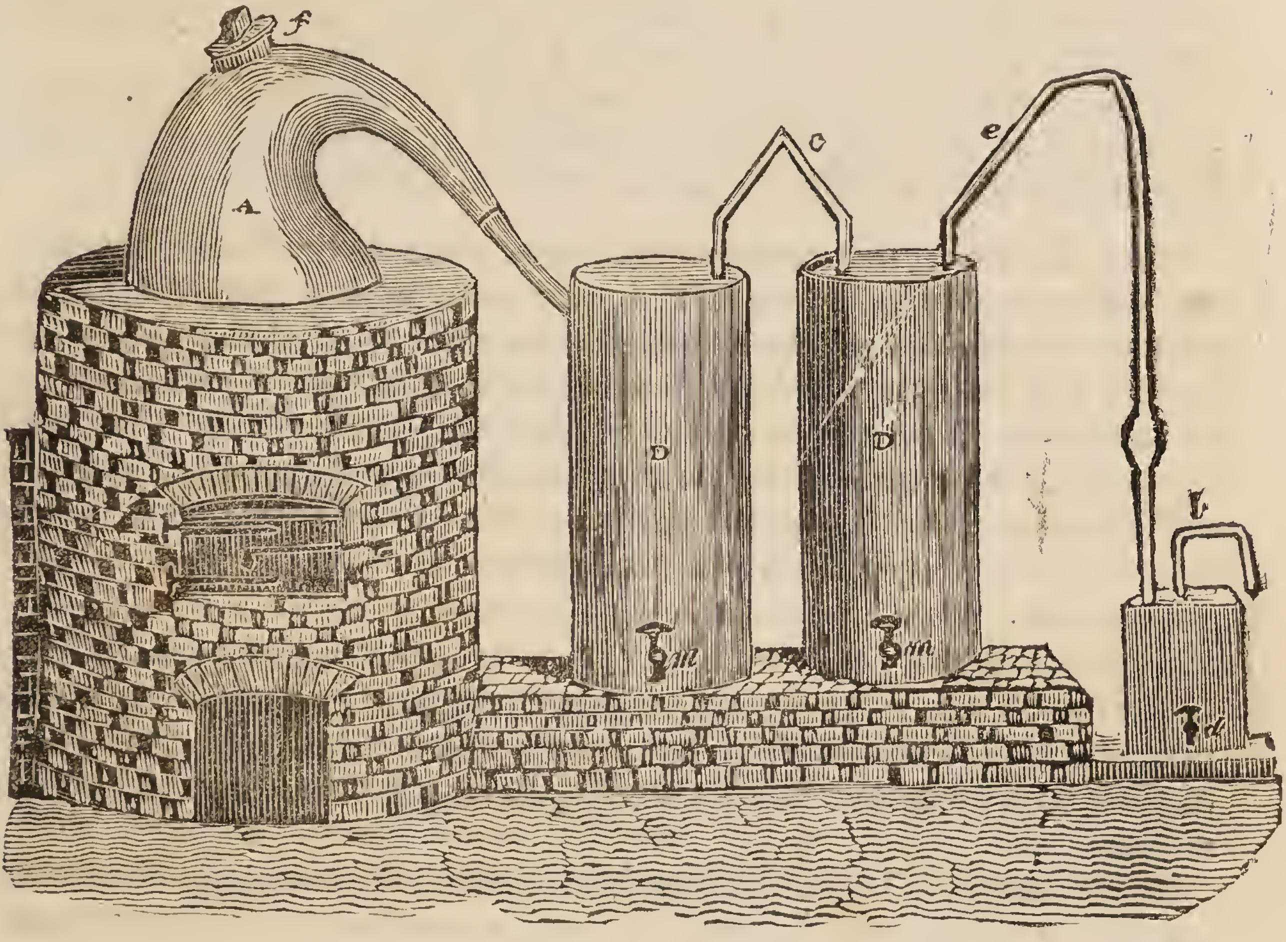
166. TO FORM ARTIFICIAL ATMOSPHERICAL AIR.—Burn a piece of phosphorous in a jar of atmospherical air to consume the oxygen, and after the remaining air has become transparent, introduce as much oxygen gas into the jar as has been consumed by the phosphorus; then take another jar of equal size, containing common atmospherical air, and placing the two jars on the shelf of the pneumatic trough, introduce a lighted candle into each, and they will both burn with equal splendour and equally long.

Dr. Stuart's medical tract, No. 13

Being No. 5, of the

CHEMICAL EXPERIMENTALIST.

167. NITRIC ACID APPARATUS.



168. OXYGEN GAS—ATOMIC WEIGHT, 8.—This is one of the most important agents in nature. Scarcely a process of any description takes place, in which it has not a place. In a simple state, it is obtained only in the form of *gas*. The air of the atmosphere contains one-fifth of its bulk of it; and water, 75 parts in every 100. It is colourless, invisible, tasteless, inodorous, and elastic. It is slightly soluble in water, and is a powerful supporter of combustion when any inflamed body, such as a lighted taper, is put into it, it burns with great splendour—much more so than if it were put into common air; indeed it is owing to the oxygen it contains, that common air supports combustion at all. Its presence is essential for the continuance of animal life, as we cannot breathe air which has been deprived of its oxygen; and an animal lives, and a combustible body burns, much longer in a quantity of oxygen gas, than it would in the same quantity of atmospherical air. Hence it is evident, that oxygen is a principle which is a supporter of both life and fire.

169. Put one ounce of the black oxide of manganese into a retort, and pour upon it as much strong sulphuric acid (oil of vitriol) as will convert it into a thin paste. Support the retort upon a wire stand, and let the open end of it dip under the edge of the glass vessel which is placed on the shelf of the pneumatic trough (represented 34, 78) full of water to receive the gas; then apply the gentle heat of a lamp to the retort, and the gas will continue to make so long as the manganese contains any of it.

Observation 1st. –The gas proceeds imperceptibly along the tube of the retort, but when it rises into the jar it produces an appearance similar to boiling; and as it rises in the jar, the water is depressed, and when the jar is empty of water it is full of gas.

Observation 2nd.—In this experiment, the sulphuric acid expels a portion of the oxygen from the black oxide of manganese, and combining itself with the residue, forms sulphate of manganese.

170. To procure Oxygen Gas when a large quantity is wanted.—Procure a small iron bottle, or retort, with a metallic tube or pipe to convey the gas to the receiver on the shelf of the pneumatic trough (34 or 78); fill the retort about half full of the black oxide of manganese, or red lead, insert the pipe in its place, then put the retort into a strong fire, and when it becomes red-hot, the gas will be evolved with great rapidity. Oxygen gas may also be obtained from nitre, or from oxymuriate of potash, heated in a glass retort.

171. To shew that Oxygen Gas is heavier than Atmospherical Air.—Take a jar of oxygen gas, and lift it from the shelf of the pneumatic trough, holding its mouth downwards, and the whole of the gas will have made its escape, having fallen from the jar like water.

Observation.—This last experiment shews the necessity of attending to the position of the jar, when any experiment is to be performed with the gas contained in it. If a gas is lighter than atmospheric air, it is evident the gas will escape when the open end of the jar is held upward; and the same thing will happen when it is held downward, if it contain a gas that is heavier than atmospheric air.

172. To shew that in Oxygen Gas a Candle burns with more brilliancy and much longer than in Atmospheric Air.—Take two candles of the same size, when they are lighted and burning with equal brightness, put one of them into a jar of oxygen gas, and the other in a jar of equal size, containing atmospheric air; when it will be found the one in the oxygen gas will burn more than double the time of the other, and with a rapidity, a brilliancy of flame, and an evolution of light, truly wonderful.

173. To shew that in Oxygen Gas a Candle just put out will re-light.—Take a jar, and fill it with oxygen gas, then introduce a candle into it, which has just newly been put out and still retains part of the wick red-hot; it will immediately be re-lighted with a slight explosion; it may even be put out again, and rekindled by the same jar of gas.

174. To exhibit the Combustion of Charcoal in Oxygen Gas.—Take a small piece of red-hot charcoal, and fasten it to the end of a copper wire, then let it down into a jar containing oxygen gas, and the appearance will be very beautiful; for the charcoal burns with great splendour, and throws out innumerable sparks in all directions.

175. To exhibit the Combustion of Iron Wire in Oxygen Gas.—Take a piece of fine iron wire, and coil it up in a spiral form. Fasten a little flax, or cotton, to one end of it, and dip it in melted sulphur. The other end of the wire is to be fixed to a cork, so that the spiral may hang straight down; light the sulphur, and introduce the wire into the bottle of gas, suspending it by the cork, which is simply to be laid on the mouth of the bottle, and the iron will immediately begin to burn with a most brilliant light, throwing out a number of meteor-like coruscations of lighted sparks in all directions

176. To exhibit a splendid Combustion of Phosphorus, and a Fall of Snow, in Oxygen Gas, and the production of Phosphoric Acid.—Place a piece of phosphorus about the size of a small pea in a copper cup about the size of a button, fastened to a thick iron wire, the other end of which is fastened to a cork. Set fire to the phosphorus, and immediately plunge it into a bottle of oxygen gas, suspending it by the cork; and the light will be so excessively brilliant, that it will be impossible to look at it.

Observation.—This is one of the most beautiful experiments which it is possible to exhibit; not only is the light produced brilliant, but the condensation and precipitation of phosphoric acid in white flakes, gives a beautiful representation of the falling of snow, (in miniature.) Jars for performing the two last experiments without much danger of breaking, and without the trouble of using sand, may be had in all shops where chemical apparatus are sold.

177. To exhibit the Combustion of Zinc in Oxygen Gas, and formation of Oxide of Zinc.—Instead of the phosphorus used in last experiment, substitute a small ball of zinc turnings, in which about half a grain of phosphorus has been enclosed. Set fire to the phosphorus, and quickly place it in a bottle or jar of oxygen gas. The zinc will be inflamed, and will burn with a beautiful white light.

178. To exhibit the Combustion of Metallic Arsenic in Oxygen Gas.—Take a little arsenic in the metallic state, and moisten it with spirit of turpentine, then light and insert it as quickly as possible into a jar of oxygen gas, and the combustion of the arsenic will appear very beautiful.

Observation.—During every combustion in oxygen gas, the quantity of gas suffers a diminution. This may easily be perceived by the rise of the water into the jar, in which any substance has been burned in a jar over water; for when the combustion has ceased, the water will immediately rise in the jar.

179. To shew that Oxygen Gas supports Animal Life much longer than Common Air.—Take a mouse, a bird, or some small

animal, and place it in a jar of oxygen gas, and it will survive five or six times longer than another animal in an equal-sized jar of atmospheric air.

180. TO MEASURE THE PROPORTION OF OXYGEN GAS CONTAINED IN THE ATMOSPHERE.—Take a glass tube closed at one end, and divided into 100 equal parts, fill it with atmospheric air, and invert it in a cup filled with a solution of sulphuret of potash. The liquid will ascend gradually in the tube, till at the end of three or four days, it will have reached the twenty-second or twenty-third division, when it will remain stationary, which shews that the proportion of oxygen in the atmosphere is about twenty-two parts in the hundred.

Observation.—As the performance of this experiment requires some days, it may be performed more quickly by the following experiment:—

181. METHOD OF MEASURING THE PROPORTION OF OXYGEN IN THE ATMOSPHERE, BY MEANS OF PHOSPHORUS.—Procure a glass tube, about twelve or fifteen inches long, and half an inch diameter, open at one end, and divided into 100 equal parts. Take a small bit of phosphorus, and place it in a small hollow cup of copper on the shelf of the pneumatic trough, a little raised above the surface of the water; inflame the phosphorus, and then place the open end of the graduated tube filled with atmospherical air over. When the combustion ceases, the water will have risen in the tube and occupy the place of the oxygen gas consumed, and the division to which it has reached will shew the number of parts of oxygen in 100 of atmospherical air.

Observation.—This is not the most accurate method of measuring the proportion of oxygen gas in the atmosphere, but it affords a pretty correct idea of it. The proportion of oxygen being about 22 parts in the hundred, the other 78 is nitrogen.

182. TO SHEW THAT ATMOSPHERIC AIR, DEPRIVED OF ITS OXYGEN, WILL NOT SUPPORT ANIMAL LIFE.—Take a jar of atmospherical air, and burn a little phosphorus in it, as directed in last experiment; after the phosphorus has absorbed the oxygen, and the remaining gas has become transparent by standing a short time over the water, on the shelf of the pneumatic trough, transfer it into another jar which it will exactly fill; then introduce a mouse, or other small animal into the jar, and it will die in the course of half a min ute.

183. NITRATE OF POTASS—SALTPETRE.—It is a compound of one atom of *Nitric Acid*, and one atom of *Potassium*;—Therefore, to procure NITRIC ACID, we must decompose the NITRE—viz. separate the Nitric Acid from the Potassinm.

184. TO PREPARE NITRIC ACID.—Take 10 ℔s. of purified Nitre and put it into the retort (fig. 167) with 5 ℔s. Sulphuric Acid, (oil of vitriol,) apply a gentle heat, and in a short time red transparent fumes will appear in the retort, which must be condensed in the *Receivers*, (as shewn in the figures) cold water or cloth wetted with it, and laid over the receivers, tend to condense the gas rapidly, and thus Nitric Acid is formed.

185. Illustration of Last Experiment.—When Nitrate of Potass, which is Nitric Acid, and the metal Potassium, in chemical combination, is submitted to the action of sulphuric acid, *aided by heat,* a chemical decomposition and composition takes place. The nitric acid of the nitrate of potass is set at liberty, and condensed by cold in the receivers, while the sulphuric acid combines with the potass—forming the sulphate of potass.

186. Preparation of Nitric Acid, a Profitable Speculation.—The preparation of nitric acid, (experiment 184) appears more as a piece of amusing pastime, than any thing else. It may therefore not be thought out of place here, to enquire what is the expense of the materials used, and the value of the chemicals produced, as such enquiry may tend to stimulate some individuals to better their condition, who at present toil out a weary existence without knowing of any thing better to do.

Cost of materials *as to be had* at any drug warehouse—

10 ℔s. nitre, ...	at 4d. per ℔.	3s.4d.	4s. 2d. cost of materials.
5 ℔s. sulphuric acid,	at 2d. per ℔.	10d.	

15 ℔s. from this we obtain as follows; rather more than 6 ℔s. of the strongest nitric acid, and have a residuum of 9 ℔s. sulphate of potass:—

6 ℔s. nitric acid, ...	@ 1s.4d ⅌ ℔.	8s.	17s. cost of products.
9 ℔s. sulphate of potass,	@ 1s. ⅌ lb.	9s.	
			4s.2d. materials.
			12s.10d. profit.

The above is a pretty correct calculation of the cost of the materials and the products, it may be seen I have rated the materials perhaps rather high, and the nitric acid product rather low, but it is best to keep within the mark. I have found 1s. to be the price of the pound of the sulphate of potass, powdered. I have neglected to charge a little for fire, but as that would be a mere trifle, it will be more than balanced by the amusement.

187. CHROMIUM—a metal of a greyish-white colour, brittle, and very difficult to fuse; it unites with oxygen, and forms a fine green oxide, and with oxygen and hydrogen it forms chromic acid—there is also a brown oxide.

188. TO FORM CHROMATE OF POTASS.—Take of the chromate of iron ore, and add to it one-third of its weight of nitre, and let them be roasted together. The nitric acid of the nitre goes to the oxide of chrome in the iron, and forms chromic acid, and this chromic acid combines with the potass of the nitre—forming the chromate of potass.

189. To form beautiful Yellow Chrystalized Chromate of Potass.—Throw the roasted materials of last experiment into hot water, and the chromate of potass will be dissolved, pour off the liquid solution and set it past to crystalize; by repeating the solu-

tion and crystalization, it will form very beautiful crystals of the chromate of potass.

190. TO PREPARE CHROME YELLOW—Chromate of Lead.—Prepare a solution of chromate of potass, (188), also, prepare another of acetate of lead, (sugar of lead)—pour the one solution into the other, and a fine beautiful yellow precipitate of the chromate of lead—CHROME YELLOW—will be seen falling to the bottom of the vessel.

191. To prepare those beautiful Cakes of Chrome Yellow, used in Landscape and Miniature Painting, which are sold at 1s. and upwards, each.—Take of the yellow precipitate of last experiment, and dry it, then make it up with gum-water and isinglass into the consistency of a firm paste, and press it into little moulds cut out of a piece of wood, which must be well greased. Thus may 40 cakes be made for the value (as commonly sold) of 1s. and the experimentalist may have one cake of the value of 1s. to himself, besides his amusement in conducting the experiment. He may also stamp his *coat of arms* on each cake, while it is soft in the mould—if he choose to decorate himself with that *bauble.*

N. B. This experiment is much more profitable than 186—Nitric Acid.

192. To prepare Chrome Yellow for House and Sign Painters.—Take of sulphate of lead, or pipe clay, and add to experiment 190, thus may an inferior Chrome Yellow be had at a very cheap rate.

193. To vary the Shade of Chrome Yellow.—A little muriatic acid—spirit of salt—or sulphuric acid—oil of vitriol—added to the chromate of potass, raises the colour from every shade of yellow, up to that of golden orange, and the experiments 190, 191, 192, will all retain the particular shade communicated to them, as here described—whether as paint, dye, or show-bottle, or to whatever other they may be applied.

194. To form a Brilliant Yellow or Gold-coloured Liquid, for a Drug-Shop Window Show-Bottle.—Dissolve chromate of potass in pure rain water, till you have the colour you wish, and regulate the shade by experiment 193.

195. TO DYE CALICO OR COTTON, YELLOW.—First make a solution of sugar of lead, dip the article into it, afterwards dip it into a solution of chromate of potass, and it will be dyed yellow.

196. To make YELLOW FIGURES on a RED-GROUND.—Calico dyed with madder is printed of a certain pattern, by the topical application of citric or tartaric acid, it is then either exposed to chlorine, 107—to liquid chlorine, 108—or to chloride of lime, 114—when the pattern printed with the acid will be bleached white, while the ground of the cloth will still retain its red colour; these whitened parts must now be covered with a solution of sugar of lead, and afterwards dipped in a solution of chromate of potass, 188, and the result will be a red cloth with yellow figures on it.

197. TO MAKE CHROMIUM STEEL.—An alloy of cast-steel with one-hundredth part of chromium, forges better than cast-steel; knifes or razors made with this compound metal proves very good; their edges are hard and solid; but their most remarkable feature is the fine damask they take, when washed over with sulphuric acid. The damask is composed of white silvery veins, probably pure chromium, on which acids have no action. *Chromium-Steel* is prepared by fusing together cast-steel, and an alloy of chromium and iron.

198. TO DETERMINE BY MEANS OF NITRIC ACID, WHITHER A RAZOR, OR OTHER POLISHED-EDGE TOOL, BE OF AN EQUAL DEGREE OF HARDNESS.—Apply this acid to bright steel, and if it be not of an equal degree of hardness, a black tinge will appear more speedily and strongly where the tool is hardest.

199. FUSIBLE METAL BATHS, FOR GIVING A SURE AND CERTAIN TEMPER TO EDGE-TOOLS OF ALL DESCRIPTIONS.—Merely lay the tool you wish to temper, or as many as you please, on the surface of the metal of the fusible bath, and apply heat to melt the metal in the bath, when it melts, the tools should be suddenly plunged in cold water, and thus they will have acquired the desired temper.

200. TABLE OF THE COMPOSITION OF METALLIC BATHS FOR TEMPERING OF EDGE-TOOLS, &c.——

No.	Edge Tools to be tempered in the various Baths.	Composition of the Bath.	Temper. Fahren.
1	Lancets, in a Bath composed of	7 lead 4 tin	420°
2	Surgical instruments	7½ lead 4 tin	430
3	Razors, &c.	8 lead 4 tin	445
4	Penknives, and scalpels........	8½ lead 4 tin	450
5	Larger penknives, &c...........	10 lead 4 tin	470
6	Scissors, shears, garden hoes, cold chisels, &c.	14 lead 4 tin	490
7	Axes, firmer chisels, plane-irons, pocket-knives, &c.	19 lead 4 tin	509
8	Table-knives, large shears, &c. .	30 lead 4 tin	530
9	Swords, watch-springs &c.	48 lead 4 tin	550
10	Daggers, augers, small fine saws, &c.	50 lead 2 tin	558
11	Pit-saws, hand-saws, &c.	Boiling lins^{d} oil	600
12	Articles which require to be still somewhat softer	Melting lead	612

201. COLOURED FLAME, WHICH, IN THE DARK, BEING REFLECTED FROM THE FACES OF SPECTATORS, MAKE THEM APPEAR AS IF DEAD.—Pour into a ladle, previously warmed, four parts of alcohol, (spirit

of wine), upon one part of chloride of sodium, (common salt), and set fire to it; keep it heated and stirring while burning, when all the persons around you will appear as hideous ghastly figures.

202. A CHINESE LIGHT—FIREWORK.—

1½ parts Gunpowder,
5½ parts Sulphur,
12 parts Nitre, (Saltpetre)

Let these ingredients be powdered and well mixed together, then ram it into paper moulds, or any narrow vessel, and set fire to it—it produces a very intense light.

203. INSTANTANEOUS LIGHT, WITH INTENSE HEAT AND EXPLOSION INTO FLAME.—Heat a small tea-cup, and put into it a little warm turpentine, then pour into it, quickly, from a phial attached to the end of a long stick, (for fear of accident), some of the nitric acid, procured by experiment 176, it will instantaneously burst forth in a volume of smoke and flame.

204. TO MAKE GUNPOWDER.—Powder separately

5 parts of nitrate of potass, (saltpetre)
1 part sulphur, and
1 part newly burnt charcoal,

Then let them be well mixed together with a little water in a mortar, till a paste or dough is formed; let this paste be rubbed down into grains, by means of a little of the dry compound powder, to prevent it sticking to the hands, and dry by a gentle heat, and good gunpowder is formed.

205. TO MAKE POWDER FOR FIRE-WORKS, A GOOD SUBSTITUTE FOR MEAL POWDER.—Powder separately

5 parts of nitre,
1 part sulphur,
1 part charcoal,

Let the powdered nitric and charcoal be well roasted at the fire—then mix all well, and preserve from damp in well stopt bottles.

206. FRENCH POLISH—*Perryonett's Receipt for that famous Varnish for Wood*—

8 gills of spirit of wine,
4 ounces of shell-lac, and
1 ounce of gum sandarac,

Put the gum sandarac and shell-lac into the spirit of wine in a stone bottle, and set it past in a moderately warm place, shaking the bottle once or twice a-day till all be dissolved.

Note. The spirit of wine must be strong; also, particularly note, plenty of *elbow-grease* is required in applying this varnish.

207. TO PREPARE GREEN INK.—Dissolve distilled verdigris in strong vinegar, and make it into a proper consistency for writing with—with a solution of gum arabic.

208. TO MAKE YELLOW INK.—A little alum added to saffron and water, makes a very good yellow ink, thicken with gum.

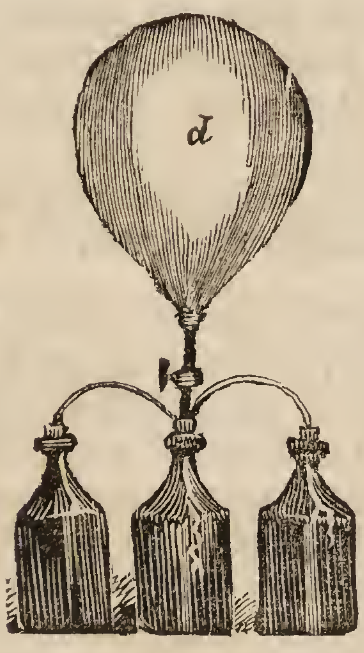
Dr. Stuart's medical tract, No. 14

Being No. 6, of the

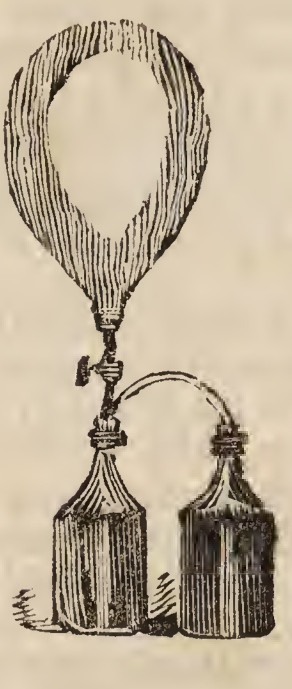
CHEMICAL EXPERIMENTALIST.

GAS PURIFYING APPARATUS.

209.



210.



211. AIR-BALLOONS.—A recent invention, is the *maw* of a turkey made into a shape resembling an inflated bladder, it is so extremely light, that when filled with *hydrogen gas,* and left free in the atmosphere, it ascends. This little contrivance is very convenient for shewing the lightness of hydrogen gas, and gives a true representation of *Aerostation* in miniature.

Note. This pretty apparatus may be had of the Philosophical instrument makers in almost every town in Britain but GLASGOW!! I have called at all the shops and cannot find one.

212. TO MAKE SILK AIR-BALLOONS.—Take a piece of thin silk and cut it in oval stripes, nearly in shape like the sections of a lemon, and sew them all edge to edge, having a small opening at the bottom for the admission of the hydrogen gas. In order to prevent the escape of the gas, the seams, and also the silk, must be well varnished several times.

213. TO FILL AN AIR-BALLOON.—Put the ingredients mentioned, (experiment 4,) into one or more bottles, according to the quantity of gas required, and connect these bottles with another bottle nearly full of water, to which the balloon is attached, (see 209, 210,) and thus the gas will be freed entirely from acid, and may be conveyed into the silk balloon without injuring it.

214. TO MAKE A FIRE-BALLOON.—Take eight sheets of paper, either India, bank-post, or stout tissue; cut each sheet in an oblong round form, like the *lith* of an orange, and with good paste join the broad parts together: then paste the edges of the whole together, leaving the bottom part open, to serve as a neck or mouth. If you perceive any holes in any part of it, cover them neatly over, and hang it up to dry. When it is quite dry, paste a bit of fine wire round the bottom of its neck or mouth, to keep it open, and put four cross wires a little way in the mouth, on the middle of which place a spunge. Then get half a gill of spirits of wine, dip your spunge into it, and set fire to what remains in the cup; holding the mouth of the balloon over the spirits of wine. When you think it is filled enough, place your spunge on your wires, and set fire to that, and you will see your balloon ascend in a regular and pleasing manner.

Note. These balloons are sold at 3s.6d. each—you may make one for 4d. and the expense of a little *amusing recreation.*

215. TO MAKE A MINIATURE SEA OF CARBONIC ACID GAS, ON WHICH A LARGE BODY (COMPLETELY FULL) MAY BE CAUSED TO SAIL TO AND FRO ON ITS SURFACE, LIKE A VESSEL AT SEA.—Fill a large wash-hand bason, with carbonic acid gas, (as directed experiment 61,) but instead of using the *pneumatic trough,* merely conduct the end of a tube from the florence flask to the bottom of the bason, and the gas from its great weight will fill the bason, and run over its edge like water. Take a tobacco-pipe, and some soap-lather, and blow globes, or balloons, with common air, such as children make when amusing themselves—let them fall into the bason, and they will rebound from the surface of the gas in it, like a foot-ball, then float upon it like a barrel upon water, and will seem to float in the air, or rest upon nothing, within the circle of the mouth of the bason.

216. TO MAKE ROSIN-BALLOONS.—If rosin be melted by the heat of *boiling water,* it may be blown into pleasing strings of beads, whose size may be increased, by the operator holding the tobacco-pipe more vertically, (as in blowing soap bubbles) the only difference in blowing these, from those in *soap,* consists in adapting the strength of blowing, in proportion to the viscidity of the *rosin,* some bubbles will be small as *beads,* others larger, all transparent, and refracting the rays of light, in all their varied hues and splendour;—kept out of dust, they retain their form a long time—half a year for certain; though they may be preserved twice or thrice that time,—and when blown to the size of eggs or lemons, form very pretty chimney ornaments.

Note. These balloons suit well for the last experiment, not being so evanescent as those blown with soap; they also make very interesting ornaments filled with *hydrogen gas,* to float about the ceiling of a room; but it must also be recollected that the first current of air would not only change the position of your rosin *bubble,* but carry it off entirely. The gas with which our houses are lighted, forms a good substitute for the *hydrogen,* required to fill these *aerial* ornaments with: place the mouth of a bladder over the burner of one of your gas-pipes, when it is full, fix a tobacco-pipe in its stead, and thus floating balloons of any number and size may be obtained.

217. SODIUM.—A metal lighter than water, of a silver-white colour, and metallic splendour; at a red-heat, it takes the form of gas; at a lower heat, it becomes fluid; lower still, it takes the consistency of wax; colder still, it becomes malleable; and at a temperature below the freezing point of water, it is *brittle;* when thrown upon cold water, it floats, hisses, whirls about, and decomposes the water, abstracting the oxygen, and setting the hydrogen free; at the same time there is an evolution of *yellow flame.*

218. TWO METALS, WHICH WHEN BROUGHT INTO CONTACT CAUSE AN EXPLOSION.—Throw a small piece of sodium upon the surface of mercury, and an explosion will be the immediate result.

219. SODA—is a compound of one atom sodium, (24) and one atom of oxygen, (8) hence its atomic equivalent is 32.—Soda therefore is just the oxide of sodium—or, the metal sodium in the state of *rust—i. e. oxidated*—as we say of iron when *rusted.*

220. CARBONATE OF SODA—is a compound of one atom of soda, (32) and one atom of carbonic acid, (22)—(see paragraph 60)—the atomic equivalent therefore of carbonate of soda is 54.

221. CRYSTALLIZED CARBONATE OF SODA—COMMON SODA OF THE SHOPS—is a compound of one atom of the carbonate of soda, (54) and seven atoms of water, (63) The atomic equivalent of crystallized carbonate of soda is therefore 117. The plain English of which is, when you purchase 117 lbs. of soda, you purchase 63 lbs. of water, 22 lbs. of carbonic acid gas, and only 32 lbs. of soda, and *that* SODA is 24 lbs. of the metal sodium, and 8 lbs. of oxygen gas.

222. TO PREPARE SULPHATE OF SODA—GLAUBERS' SALTS.—Make a solution of the carbonate of soda, *(common soda of the shops)* and add sulphuric acid (oil of vitriol) till effervescence ceases; evaporate for a short time, and set it past to cool, when beautiful crystals of GLAUBERS' SALTS will be formed.

223. TO FORM CHLORIDE OF SODIUM—KITCHEN SALT—COMMON SALT—SEA SALT—MURIATE OF SODA.—This useful and many named salt may be made perfectly *pure,* as follows:—Dissolve carbonate of soda (soda of the shops) in water, till it will dissolve no more; then drop muriatic acid (spirit of salt) into the solution, so long as any effervescence takes place, then filter, and evaporate, and you will get crystals of *pure salt.*

224. TO MAKE BASKET SALT, OR WHAT HAS BEEN CALLED REFINED SALT IN BASKETS.—Turn the wide mouth of the basket upwards, and fill it with common salt, then put as much salt into a kettle of water as it will dissolve, and pour the saturated solution of salt on

the salt in the basket, let the basket drain, and thus you will have prepared *refined basket salt.*

225. To make Carbonate of Magnesia—Common Magnesia—Dissolve some sulphate of magnesia (Epsom salts—*refined salts)* in a tumbler of water, then pour into this solution of salts, as much more water, in which has been previously dissolved twice as much carbonate of soda, (common soda) and an immediate precipitation of magnesia will take place, the precipitate may be thrown on a filter and dried, and thus you will have prepared magnesia.

226. Explanation of Last Experiment.—EPSOM SALTS is a compound of *sulphuric acid* and *magnesia,*—SODA is a compound of *carbonic acid* and *soda.* When the one solution is poured into the other, the sulphuric acid of the Epsom salts leaves the magnesia, it was there in combination with, and combines with the soda of the *carbonate of soda,* forming the sulphate of soda—Glaubers' Salts, (see 222) the carbonic acid of the soda having left the soda, at the same time to combine with the magnesia of the Epsom salts, and forming CARBONATE OF MAGNESIA. Thus at any time, by means of a little common soda, and one penny worth of Epsom salts, may be formed MAGNESIA, and also GLAUBER'S SALTS.

227. TO PREPARE EPSOM SALTS.—To five parts of oil of vitriol, add eight parts of rain water, and put CARBONATE OF MAGNESIA (common magnesia) into the mixture till the effervessence ceases, then evaporate and a beautiful crystallization of Epsom salts will be the result.

228. Explanation of Experiment 227.—The sulphuric acid abstracts the magnesia from the carbonic acid—in the carbonate of magnesia—and forms sulphate of magnesia, while the carbonic acid is set free, in its natural form of gas, and causes the effervescence we behold. When the effervessence ceases, it is a sign that the sulphuric acid is all combined, therefore, it would be of no use to add any more *magnesia.* The eight parts of water that is added to the acid is required as water of crystallization in forming the salt—*Because Epsom Salts* is composed of 5 acid, 2½ magnesia, 8 parts water of crystallization. Therefore 5 ounces of acid, 2½ ounces of magnesia, and 8 ounces of water, will form 15½ ounces of *salts.*

229. TO PREPARE CHELTENHAM SALTS.—Take of the sulphate of soda, (experiment 222), and subject it to a moderate heat, till the water of crystallization is driven off; you will then have what is called *Cheltenham Salts,* (sulphate of soda) to make one ounce of which, and which sells at 2s.9d. will not cost one farthing. These *salts* have been much run after by the *rich,* therefore, he who wishes a *rich-man's-mouthful* may have it at a very cheap rate.

230. A curious instance of the Production of Heat, by the conversion of a Liquid into a Solid, by Instantaneous Crystallization.—Put into four ounces of boiling water, as much sulphate of soda (see experiment 222) as it will dissolve, (about 7 oz.)

and nearly fill a phial with it while boiling hot, cork it quickly and closely, then let it stand to cool; it will still be fluid, but the moment you draw the cork, a beautiful crystallization will immediately take place, and so much heat will be given out, as to make the phial warm.

231. Explanation of Experiment 230.—Hot water dissolves more sulphate of soda, than when cold; and cold water dissolves more sulphate of soda, when the pressure of the atmosphere is removed, *than otherwise it would do.* Therefore, when the phial was *nearly* filled with the boiling solution, and immediately corked, the part not filled with the solution was filled with steam; and as the phial and its contents cooled, a partial vacuum was formed by the condensation of that steam, therefore the pressure of the atmosphere was in a corresponding degree removed from the surface of the *liquid.* The cold water of the solution was, therefore, still able to retain the excess of salt, which otherwise would have been precipitated from the hot solution left to cool under the ordinary atmospheric pressure. The heat is the consequence of the crystallized salt occupying less space than when in the liquid state, it was then *latent,* it is now *free* heat.

Note. If you plunge the phial into hot water till it is boiling, its contents will be dissolved, cork it close, and thus you may repeat the experiment as often as you please.

232. TO BOIL AN EGG WITHOUT FIRE—by adding Cold Water to another Cold Liquid.—Take two tumblers the one to be considerably smaller than the other, and the crystal very thin, let it be put into the inside of the other, and into it put the egg, and cover it with cold water; then let a mixture of one part of water, and four parts of the *strongest* oil of vitriol, be put into the outside glass, and in a very short time, the water in the inside glass will be heated, and the egg will be done. The temperature will immediately rise to 300 degrees—water boils at 212.

Note. In mixing oil of vitriol and water, take care not to do it too suddenly as the vessel may break and do damage.

233. Explanation of Experiment 232.—It is an axiom in chemical science, that bodies in acquiring condensation give out *heat,* thus four measured ounces of sulphuric acid, and one measured ounce of water, will not when mixed give five ounces by measure; indeed not much more than four; therefore this condensation is the source of the heat, thus water gives out *heat* when *freezing,*—and when water is thrown on quicklime, it gives out more heat than when it is freezing, it is therefore more condensed. It is on the same account we have a constant rise of temperature in the atmosphere after rain, owing to the watery vapour giving out heat, while it is changing, being condensed from the bulky form of *air or vapour,* to that of water.

234. CALCIUM—a silver-white metal, which is rapidly OXIDATED, or *rusted* in the air, and is then called Lime.

235. LIME—is a most important earth, with carbonic and sulphuric acid, it forms whole mountains, and with phosphoric acid, it forms the basis of the bones of men and animals.

236. Sulphate of Lime— Plaster of Paris—Gypsum Alabaster.—This salt is widely diffused through the world, large mountains of it are found in different countries—calcination deprives it of its water, and converts it into *Stucco*, or, what is called Plaster of Paris. It is then a fine white powder, which when mixed with water, becomes heated and hardens to a solid mass, it is therefore much used for *potters' moulds*, images, medallions, &c.

237. TO PREPARE STUCCO.—It must first be ground in a mill exactly similar to what is generally used for grinding wheat, by means of a pair of flour stones.

238. TO BAKE OR BOIL STUCCO.—After Plaster of Paris has been ground, as directed in experiment 237, it must be *baked*, or more properly speaking boiled, to expel the water, (27 ⅌ cent) which is one of its component parts; it may appear, at first sight, ridiculous to talk of boiling a dry earthy substance, without previously adding water or some other liquid, but it is no less true that ground plaster when heated, has all the appearance of boiling, and the workmen call the finished article *boiled plaster*. It is boiled in very long troughs built with brick, and a fire-place runs underneath them from the one end to the other: sulphate of lime having been thus deprived of its water, is a soft impalpable powder, and if its own proportion of water (viz. 27 ⅌ cent.) be again mixed with it, it will immediately become a hard compact mass. It is this property which renders it so fit for the statuary, the modeller, the stereotype founder and the potter.

239. To take a Plaster of Paris Mould from a Person's Face.—The person must lie on his back, and his hair must be tied behind, and his beard well shaved. Then into each nostril put a conical piece of paper, or a quill open at each end, to allow breathing; then oil the face lightly and pour the plaster (mixed up to the thickness of thick cream with warm water) over it, till it be a quarter of an inch or more in thickness, and in a few minutes the plaster may be removed, by the person moving the muscles of his face *within* it—it is necessary to make a ring of putty round the face to keep the plaster from mixing with the hair of the head, and the eyes must be kept shut.

240. To take a Cast from a Mould which shall be an Exact Likeness of the Person the Mould was taken from.—Let the mould (239) be perfectly dried, then brush it over plentifully with boiled linseed oil, made more drying by means of white vitriol, or sugar of lead. Set it now past till it be perfectly dry, and before taking a cast from it, let it be well brushed over with lintseed oil, and lard, and then pour the liquid *stucco* into the concave mould, and in a few minutes it will harden, when it may be taken out, and will give a true likeness of the person intended.

241. To give Stucco, and Stucco Figures, the appearance of Marble.—Grate one ounce of Windsor Soap into four fluid pounds of water, and dissolve it in a well-glazed vessel; then add one ounce of white wax, which must be scraped down, and as soon as the whole is incorporated, it is fit for use. Having your cast well dried, (see the above 240) dip it into the varnish, and take it out; when it has been four minutes out, the moisture will be absorbed; stir the varnish and dip again, when it will in general be done enough; but if not, one other dip will suffice. Put it aside out of the way of dust for one week, till it is dry, then with a soft muslin rag, rub the mask gently, when a brilliant gloss will be produced.

Note. Take care not to rub too hard as you may abraid the coat of varnish, and the mask would require to be re-dipt.

242. TO BRONZE STUCCO FIGURES.—Make a varnish of isinglass, by dissolving a little of it in water, then lay it over the figure, till it holds out, or till every part of its surface is wet, then with a painter's "sash tool," go over the whole. When it is dry, go over the figure with a very little thin gold size, let no more size be on the brush than what barely damps it, the figure will now have a shining appearance; set it past two days to dry, when it will be fit to receive the bronze. The bronze powder (which may be had at any colour shop) is now dusted on with a little cotton-wool, and the figure is set past another day to dry; when all the loose powder is rubbed away, you may also rub the powder from the points and prominent parts of the figure, and it will then resist the weather, and resemble metal.

243. To Brew fine Ginger Beer by a simple process.—Put one and a half ounces of ginger well bruised, into an earthen vessel, (say a wide-mouthed jar) with one ounce of cream of tartar, and one pound of white sugar; pour upon these ingredients one gallon of boiling water, and when cooled to the heat of new milk, add a table-spoonful of yeast, (barm); let the whole stand till next morning, then skim, bottle, and keep three days in a cool place—this simple made beer will now be excellent.

244. To make Iron or Steel as soft as Lead, for Engraving on.—Anoint it all over with tallow, clay, or strew hellebore on it, and quench it in the juice of common beans.

245. To harden Steel Engravings without injuring the impression or polish.—Let the soft polished steel be suspended into a quantity of *melted copper,* and when the fusion has been raised to the tempering height, suddenly plunge the melted copper, steel, and all, into a vessel of water, so that the steel may never meet the air, and thus its temper will be restored; in this manner the steel plates for engraving bank-notes are tempered.

246. TO ETCH DESIGNS UPON STEEL.—Take a polished steel plate and draw your design upon it with brunswick black, by means of a hair pencil, cover the design with wax, and pour nitric acid diluted with three times its weight of water, let it remain till

it has bit the required depth, then wash it off, and clean away the wax with turpentine.

247. TO MAKE RED FIRE FOR THEATRES. –Add to experiment 202, (chinese light) twenty-four parts of dry Nitrate of Strontian, and mix all well together, when lighted it produces an astounding blaze of red light.

248. TO MAKE GREEN FIRE FOR THEATRES.—Add to experiment 94, (Bengal light) thirty parts of dried and powdered Nitrate of Barytes, a little charcoal, and metallic arsenic, and set fire to it.

Note. If any of these fires burn slow, a little dry powdered charcoal will quicken them, and if too quick, a little calamine will make them burn slower.

249. A VALUABLE SECRET, AND SIMPLE PROCESS, TO HARDEN (TEMPER) POLISHED-STEEL, WITHOUT HURTING THE POLISH.—Dip your polished steel in, or smear it with *soft soap*, and then raise it to what heat you choose, and dip it in cold water, or lay it on the metal bath, (200) and it will still retain its pristine polish.

250. **Author's Apology.**—It has been common for authors to make apologies at the commencement of their works, —I have chosen the end of this for the same purpose. In presenting this cheap little book to the public, the first object I had in view was to meet the requests of a number of individuals who had attended my lectures on chemistry, and who had expressed a wish that I would publish a few of the experiments they had witnessed, that they might have data to recur to, at any future period, when they might have leisure, have an interest in, or might seek to amuse themselves by performing a chemical experiment. To blend the useful with the scientific, I have scattered through the whole a number of receipts, which, I trust, will be found useful to some, and not irksome to the many; I beg, therefore, most respectfully, to return thanks for your favours to the *Chemical Experimentalist*, and whenever I have finished six tracts more, being *"The Arcana of Life,"* to which I solicit your kind patronage, I will return once more, and give you other six numbers of the Chemical Experimentalist, being part second of that work.—FAREWELL!

THE

Chemical Experimentalist;

OR,

An attempt to allure by Experiment,
AND GUIDE BY REASONING,
THE ENQUIRER AFTER
RATIONAL AMUSEMENT and USEFUL KNOWLEDGE,
Towards the cultivation of the simple and sublime Science—
CHEMISTRY.

BY JOHN KNOX STUART, M. D.
FELLOW OF THE ROYAL PHYSICAL SOCIETY, AND EXTRAORDINARY MEMBER OF
THE HUNTERIAN MEDICAL SOCIETY, EDINBURGH,
AUTHOR OF
"THE MONITOR" on Consumption—THE SILENT FRIEND
—"THE DIRGE" on Cholera—THE ARCANA OF LIFE,
&c. &c.

* * *

Decomposition is that death-like scene,
Where Nature's laws decree, incessant, universal change;
While Composition's generative womb,
Prolific, gives birth, new form of life, and re-creates the whole.

* * *

PART SECOND.

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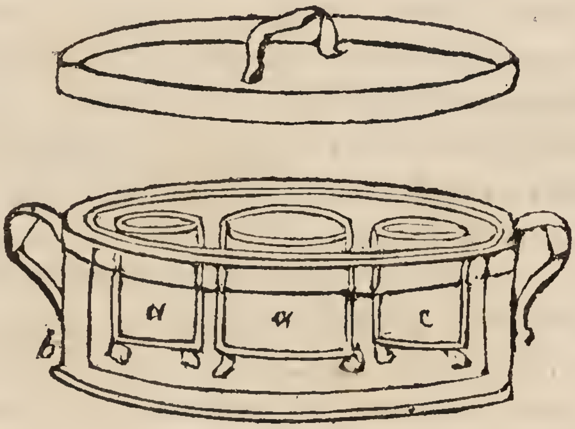
MDCCCXXXIV.

Stuart's Useful Information for the People, No. 15,

Being No. 7, of the

CHEMICAL EXPERIMENTALIST.

251. FREEZING APPARATUS.



252. Description of the Freezing Apparatus, (251).—This apparatus is composed of two larger vessels of tin-plate, and three smaller; of the two larger, the one is about two inches less in diameter than the other, and is contained in the inside of the larger; there are also three smaller ones, *d, a, c,* put them into this inside vessel, and with the lid cover the whole.

253. TO FREEZE CREAM WITHOUT ICE.—Partly fill the three internal vessels, (*d, a, c, fig.* 251,) with Muriatic Acid, then let the large internal vessel in which they are placed be filled with finely powdered crystals of Sulphate of Soda, (see 222) which ought to be perfectly dry before powdering; and let this powdered *Sulphate of Soda* be mixed with the Muriatic Acid, so as to fill the large internal vessel; now, let the cream contained in the tin vessels be put into the three small vessels inside, (*d, a, c,*) which now contain Muriatic Acid; let these three inner vessels also be filled up with the powdered salts, and cover the whole with the lid, and you shall speedily have *Ice Cream.*

Note. Muriatic Acid would speedily dissolve the tin-vessels, it is therefore necessary to give them a previous coating of wax.

254. TO FREEZE MERCURY.—Mercury freeses at 39o, that is 7° higher in temperature than what water freezes at, it may therefore be easily frozen, merely by looking over the table, (255) and picking out the freezing mixture that may suit best; all that is necessary, is to put some of the fluid Mercury into a thin glass tube, and dip that tube for a sufficient time in the freezing mixture, when the fluid metal will quickly appear in a solid form.

255. FRIGORIFIC MIXTURES, WHICH PRODUCE ICE WITHOUT THE AID OF ICE IN ANY PART OF THE WORLD.

Mixtures.		Thermometer sinks.	Degree of cold produc.
Muriate of ammonia Nitrate of potash .... Water	5 parts. 5 .. 16 ..	From — 50° to — 10°.	40
Muriate of ammonia Nitrate of potash .... Sulphate of soda ..... Water	5 parts. 5 .. 8 .. 16 ..	From — 50° to — 4°.	46
Nitrate of ammonia Water	1 part. 1 ..	From — 50° to — 4°.	46
Nitrate of ammonia Carbonate of soda.... Water	1 part. 1 .. 1 ..	From — 50° to — 7°.	57
Sulphate of soda ..... Diluted nitric acid ...	3 parts. 2 ..	From — 50° to — 3°.	53
Sulphate of soda..... Nitrate of ammonia .. Diluted nitric acid ...	6 parts. 5 .. 4 ..	From — 50° to — 14.°	64
Phosphate of soda ... Diluted nitric acid ...	9 parts. 4 ..	From — 50° to — 12°.	62
Phosphate of soda ... Nitrate of ammonia .. Diluted nitric acid ...	9 parts. 6 .. 4 ..	From — 50° to — 21°.	71
Sulphate of soda..... Muriatic acid	8 parts. 5 ..	From — 50° to — 0°.	50
Sulphate of soda..... Diluted sulphuric acid	5 parts. 4 ..	From — 50° to — 3°.	47

256. REASON WHY DURING THE LIQUEFACTION OF BODIES INTENSE COLD IS PRODUCED.—During the change of solid bodies to the fluid state, their is an absorbtion of heat, and this heat which is absorbed does not raise the sensible temperature of the bodies so dissolved, but is entirely expended in rendering the salts liquid, without at all indicating any rise of heat by the thermometer;—thus bodies intro-

duced into freezing mixtures, give out a portion of their heat, to promote the solution of the mixture, and thus if the quantity of heat required, by the freezing mixture to liquify it, be equal to the latent heat, or equal to that quantity of heat, which the body to be frozen would require to liquify it, and raise it to its specific temperature—the result will be ICE.

257. ICE FOR ICEING.—To prepare artificial Ice for articles of confectionary; get some real Ice, (if it be thought too expensive to proceed with the frigorific mixtures, 255,) and reduce it nearly to a powder, and mix it with a good proportion of *common salt*; put the *ice* and *salt* into a pail *in as cool a place as possible*, and put your cream into an ice-pot, and set that pot into the pounded ice and salt, and draw the ice and salt as close as possible around the cream-pot, cover it up and it will quickly become Ice; remove the Ice from the sides of the cream-dish as it freezes, so that a new body of cream may be exposed.

Note. There should be a number of holes in the bottom of the pail containing the mixture of the *Ice* and *Salt*, in order to drain off the water as the ice thaws.

258. TO MAKE ICE CREAMS OF ANY KIND OF FRUIT.—Mix the juice of the fruit—you wish your ice-cream to be flavoured with—with as much sugar as may be necessary to absorb the fruit-juice, and afterwards with rich cream; let the *fruit-juice* and *sugar* be mixed together, put the whole into the freezing mixture, and you will speedily have the Ice Cream wanted.

259. TO FREEZE WATER IN A WARM SUMMER DAY.—To 32 drachms of water, add 11 drachms of muriate of ammonia, (sal ammoniac), 10 of nitrate of potass, (saltpetre 183), and 16 of sulphate of soda, (Glaubers's Salts 222), all finely powdered; let the *salts* be dissolved separately in the order set down, when a thermometer put into the solution will shew that the cold is below the freezing point; a little water in a thin glass tube, immersed in it, will be frozen in a few minutes.

260. HEAT AND COLD PRODUCED BY THE SAME LIQUID, AT THE SAME TIME.—Having two vessels, the one containing *cold* water and the other *hot*, put a hand into each vessel for a little time, then have another vessel in which is water *slightly warm*, put both your hands into this vessel, and you will feel the hand that was immersed in the hot water cold, and that which was in the cold water will feel warm.

Note. *Heat and Cold* are therefore only comparative terms of sensation, *Heat* like other fluid bodies, possessed of weight, has a natural tendency to flow into such bodies as can receive it, till an equilibrium is established; therefore, the hand that had been immersed in the hot water, felt cold; when put into the water only moderately, warm; because, the excess of heat in the hand just removed from the very hot water, was leaving *that hand* to restore an equilibrium of heat in the hand, and the liquid in the vessel, and this heat leaving the hand gave the sensation of cold; and exactly the contrary sensation was felt by the other hand, that had been in the cold water, from the heat passing into it; to equalize its heat with this same vessel of moderately warm water, the sensation of heat and cold are therefore only comparative terms in both cases.

261. To prove that Water Expands when Freezing.—Perfectly fill a phial and cork it tight and securely, and expose it to a freezing mixture so that its contents may be frozen, and you shall find that when the water becomes solid the bottle will burst.

Note. This experiment explains why ice floats on water, viz.—because it is lighter—because the same quantity of water is of more bulk when frozen, than in the liquid state.

262. To cause Water to Boil, by immersing the vessel containing it, in Cold Water, and to cease boiling by immersing it in Hot Water.—Take a Florence flask or medicine phial, and half fill it with water, let it be made to boil over the fire or a spirit lamp, and while boiling instantly cork it tightly, it will now cease to boil, let some cold water be poured over it from a kettle, and it will re-commence boiling; now, pour boiling water over it, and it will cease to boil, and by pouring the cold water on it, it will again commence boiling.

Note. When we corked the flask or phial, it was full of steam, and when we poured the cold water over it, that steam was condensed, and thus the pressure of the steam being removed from the surface of the water, it recommenced boiling; but the moment we poured on it the boiling water, the steam acquired its elasticity and exerted its usual pressure on the water, and prevented its boiling; condensation of the steam again renewed the boiling from the same cause.

263. LUCIFER MATCHES—AMERICAN—Take two parts of the sulphuret of antimony, and one part of the chlorate of potash. Grind them both to a fine powder, and make them into paste with a solution of glue. Common brimstone matches are to be dipped into it, and when dry, they will inflame by being drawn through a folded piece of sand paper.

264. Lucifer's Never-failing Instantaneous Fire, Flame, Light and Heat Producers, without any mysterious preparation, whereby any person, at any time, may get a Light, or even at a moment's notice make a Fire, without the most distant chance of not succeeding.—Keep beside you a phial of the oil of turpentine, what is commonly called the spirits of turpentine, also a small phial containing a few drops of sulphuric acid, (oil of vitriol), and also a little of the chlorate of potass, (see 118, No. 3, Part First). Pour a little of your turpentine upon a piece of dry rag, paper, or tow, and laying a few scales of the chlorate of potash on the part wetted with the turpentine, touch the chlorate with a drop of the sulphuric acid, and you will at once have both flame and fire.

Note. This is an excellent way to set fire to the Bengal Light, (94), the Chinese Light, (202), and the Red and Green Fire for Theatres, (247 and 248).

265. To give an Old Gold Chain the colour and splendour of a new one.—Dissolve some muriate of ammonia (sal ammoniac) in a little old urine, and boil your chain of gold in this composition and it will return to its original colour and brilliancy.

266. The way to preserve the Body and the Feathers of Birds.—When we have a bird newly killed, with a fine plumage, and wish to preserve it for a curiosity, it is necessary to proceed in the following manner:—Open the belly of the bird with a pair of scissors, from the inferior part of the lungs downwards, and take out the intestines, liver, and the whole of the contents of the abdomen and chest, and fill up the space with the following composition:—Take of muriate of soda (common salt) one pound; of alum, powdered, four ounces, of pepper in powder, two ounces; mix the whole together; bring the cut edges together, and sew them so as to retain the composition; fill the bird, from the root of the windpipe and the beak, to the gizzard with the composition, by means of a feather; pierce the head near the root of the tongue, with the point of a pair of scissors, and take out the brain, fill it now entirely up with the composition, and touch not either the wings or thighs, but after having thus filled the bird, hang it up by the legs for two days, so that the salts may penetrate with more ease among the muscles, and ligaments, and bones of the head and neck. Now, place it in what attitude you wish, by means of two pieces of brass wire, the one passing out by the head, and the other below the tail, having also wire introduced through the legs, fix it, and let it stand for one month to give it time to dry, when you perfect the figure, and fix in glass eyes with a little gum and it is complete.

267. An amusing recreative, French method of catching, —*and if you please*—of destroying Crows.—Get a pound of meat and cut it into many morsels, about the size of a nut each, provide a quire of paper and a pot of glue, and proceed to the place where the crows assemble to destroy the grain, then with your paper make small horns something like the shape of those tapering forms we see grocers generally put up half pounds of sugar in, and ounces of tea, into each of these conical papers put a morsel of meat, and fix it at the bottom with a pin; next smear the mouth of the paper inside with the glue, and fix it mouth uppermost in the ground, and do so with as many as you please at little distances from each other, get yourself out of the way, and by and by the crows will appear eager for the meat, and thrusting their heads into the bottom of the paper traps, will endeavour to get out the meat which has been fixed with the pin, the feathers of their heads get englued in the paper contrivance, so that they cannot withdraw their heads; then, without minding their prey any more, and finding themselves blind, they take to their wings, and rise into the

air till out of sight, but always perpendicular, think not that they are out of sight, for after a little time, *that is to say*, when their strength fails, they will fall exactly at the same place from which they took their flight, when you may easily lay hold of them, or by giving each a blow on the head with a stick it will die. The Frenchmen say it is a true pleasure to see ten, twelve, and sometimes more of the crows taking to their wings all at once, with the paper caps on their heads, and afterwards seeing them fall one after another, as their strengths fail: one pound of meat has served to take sixty in a morning, as the morsels of meat are not eaten, they serve to catch others

268. COMPOSITION FOR STARS TO PUT IN ROCKETS, SERPENTS, BLUE CANDLES, WATER ROCKETS, OR OTHER SORTS OF FIREWORKS.—Saltpetre, one ounce; camphor, a quarter of an ounce; beat these very fine, and mix them; afterwards, make them up into paste with oil of turpentine, or a little lintseed oil, and form these into small balls of about the size of peas, which roll in powder dust, and let them dry. Of this sort, you may put a dozen or two or three dozen in a rocket, and other fireworks of a smaller sort or size; and they will have a very pretty effect. To fireworks of a smaller sort, a less quantity must of course be added.

269. TO MAKE A ROMAN CANDLE.—The cases for Roman candles of half an inch across the mouth, and in lengh about six inches, are as good as any. When you have made your cases, and choked them tight at one end, proceed to fill them. The charge of filling may be composed of three parts of saltpetre, one part of brimstone, one part of meal powder, and one part of finely powdered glass; or four parts of saltpetre, two parts of brimstone, one part and a half of meal powder, and one part of fine powdered glass.

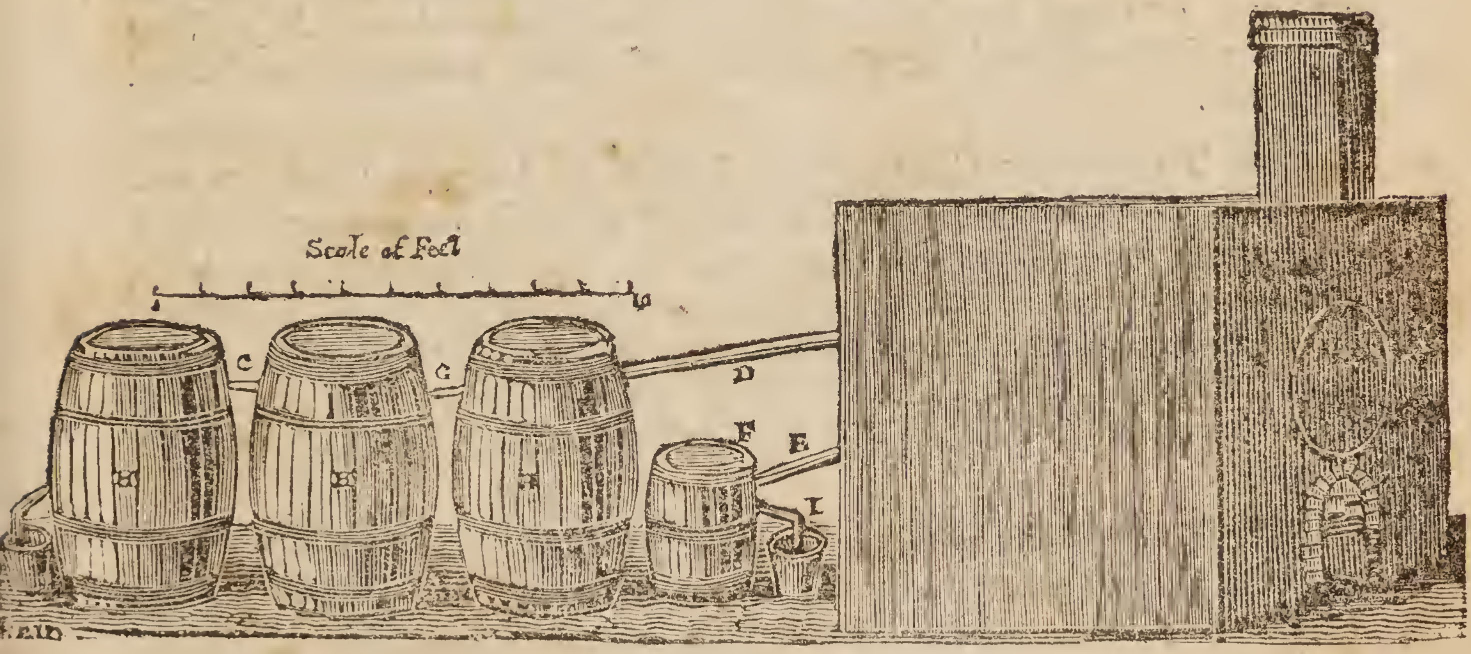
When you have finely powdered each, and well mixed them together, you can charge your cases; but, in doing this, observe the following directions; first, put in a little mealed powder, and then a star, on which ram lightly a ladle full of composition, then a little mealed powder, and on that a star, then again composition, and so on till you have filled the case. Stars for Roman Candles should not be round, but must be either square, or flat and oval, with a hole through the middle; the quantity of powder for throwing the stars, must increase as you come near the top of the case; for if much powder be put at the bottom, it will burst the case. The stars must differ in size in this manner,—let the star which you put in first, be a little less than the bore of the case; but let the next star be a little larger, and the third star a little larger than the second, and so on: increasing in diameter till within two of the top of the case, which two must fit in tight. As the loading of Roman Candles is somewhat difficult, it will be necessary to make two or three trials before you can depend on their performance. When you fill a number of Roman Candles, take care not to put into each an equal quantity of charge between the stars, so that when they are fired, they may not throw up too many stars together.

Stuart's Useful Information for the People, No. 16,

Being No. 8, of the

CHEMICAL EXPERIMENTALIST.

270. APPARATUS FOR EXTRACTING VINEGAR FROM WOOD—PYRO-LIGNEOUS-ACID.



271. ACID SPIRIT OF WOOD—WOOD VINEGAR—PYRO LIGNEOUS-ACID—VINEGAR FROM WOOD BY FIRE.—A crude Vinegar, procured from wood, by burning it in close iron cylinders. From this pyroligneous-acid is distilled off, and received in the receivers H, H, H, (see 270)—it is composed of acetic acid, tar, and an empyreumatic oil.

272. KINDS OF WOOD MOST FIT TO PREPARE PYRO-LIGNEOUS ACID FROM.—The hard-woods such as ash, oak, birch, and beech, are best suited for distillation; FIRS would not suit as they would produce turpentine instead of acid.

273. EXPLANATION OF THE APPARATUS, 270.—The brick-building of 270 gives a representation of the furnace with the cast-iron cylinder fixed horizontally in it, the end at the ash-pit represents the door, and at its farther end is represented two tubes or pipes, the uppermost D, for carrying off the acid, and the lower one E, is the pipe for conveying away the *tar*. The upper pipe D, conveys the acid into the receivers H, H, H, which are all connected by the adapters C, C. The small barrel F. is the tar receiver, the other two small vessels are meant for the escape of uncondensed gas.

274. PREPARATION OF THE WOOD FOR THE RETORTS—TO MAKE WOOD ACID.—The wood must be dry and deprived of its bark, and cut into lengths from one and a half to two feet;—it must also be split.

275. To charge the Retorts or Cylinders with the Wood.—The common size of a Pyro-Ligneous *retort* is about four feet diameter and six feet long, there is therefore plenty of room to go inside and pack it full of the billets; it is then shut close at both ends, having no openings left, except the *acid* and *tar* tubes D and E, (read 273); fire is now applied in the furnace beneath, and when the cylinder becomes red-hot, the acid, tar, and gas, will pass into their several receivers. The charge of wood for a cylinder of these dimensions is about 8 cwt., and the product of acid about 35 gallons, or every hundred-weight of wood gives about 4¼ gallons of pyro-ligneous acid of a deep brown colour, much contaminated with *tar*.

276. To rectify Crude Pyro-Ligneous Acid by a second distillation.—Put 50 gallons of the crude acid into a *copper-still*, and distill after the same manner as in the distillation of whisky, and you will have in the receiver a product of about 40 gallons of transparent brown vinegar of a strong empyreumatic smell—this is the PYRO-LIGNEOUS ACID of so much use in the *arts*—and a residuum of 10 gallons of a viscid tarry matter, in the bottom of the *still*.

277. To prepare superior—WESTPHALIA—Hams of a delicate flavour, and not liable to become rancid.—Salt your meat in the usual way, taking care to rub the salt well in, turn the meat in the brine once every day, and at the end of three or four weeks, hang it up to drain for twenty-four hours; then, with a brush dipped in the concentrated rough pyro-ligneous acid, smear the meat well *all over*, and hang it up in an airy dry place. I find one application of the acid sufficient, but a second or third will produce a more powerful Westphalia flavour.

278. TO SMOKE HAMS.—Prepare the meat as above, (see 277), and suspend the hams afterwards in the smoke of OAK—it communicates to them *their* taste, and *its* peculiar flavour. How much superior, the process recommended at 277 is to this, will be proven by the trial, both as to time and quality. The anti-septic qualities of smoke have been known from remotest antiquity, but till the modern discovery of this new *acid of wood*, the principle upon which smoke preserved *animal matter* from decomposition was quite unknown; but since the discovery of this ACID OF WOOD in a liquid form, the anti-septic qualities of smoke have been ascertained to be entirely owing to a quantity of this acid entering into its composition; therefore, what required months, after the ancient manner of smoking, may now be attained in a few minutes, by using concentrated crude vinegar of oak wood.

279. To prepare Wiltshire Smoked Bacon.—Prepare your bacon in the usual manner, but with *less salt*, afterwards wash it over with the pyro-ligneous acid, by means of a brush, and it will have acquired the smoky taste peculiar to Wiltshire bacon.

280. To prepare Smoked Herrings by Wood Acid.—Clean and lay them in salt, one night, with saltpetre, then hang them on a stick run through their eyes, in a row, give them one dip for a few seconds in the wood-acid, then hang them up to dry.

281. To prepare Smoked Herrings without Wood-Acid.—Prepare the herrings, as in paragraph 280, and having an oak cask with some saw-dust (of some of the hard-woods—*oak is best*) in its bottom, introduce into the saw-dust a heater red-hot, and fixing the stick with the herrings over the smoke, let them remain twenty-four hours, and they will be done.

282. To prepare Hamburgh Tongues.—Cut off the roots of the tongues, sprinkle some salt on them, and let them drain from the slime till next day; then for each tongue mix a spoonful of muriate of soda (*common salt*), with as much sugar, and half as much saltpetre; rub them well every day for a week, then wipe them clean, and roll them in towels wetted with pyro-ligneous acid, (according to the time they remain in the towel will be their smoked flavour), after they have remained sufficient a time therein, take them out and hang them up to dry; and thus may be prepared Hamburgh smoke dried tongues of any flavour and without taint.

283. To Pickle and Smoke Hams, Tongues, Beef, &c.—Provide a deep earthen glazed pan, that will hold four gallons, having a cover that fits close; put into it two gallons of river water, two pounds of coarse sugar, two pounds of bay-salt, two and a half of common salt, and half a pound of nitre (saltpetre). Keep the beef, hams, or tongues, as long as they will bear,—sprinkle them with sugar in a pan, and let them drain, afterwards rub them well with the pickle, and pack them close into the pan, and see there be as much pickle as will cover them; a small ham may remain *in* ten days, and tongues about a week; and pieces of meat in proportion to their size. Now, take them out of the pan and dry them, till they will drop no longer, wipe them dry with a sponge, and either immerse them in the *pyro-ligneous acid*, for a short time, or wrap them in a cloth wetted with it, or suspend them over its vapour while boiling, and hang them up to dry in an airy place, and they will then be sound, and taste as if smoke-dried.

284. TO PREPARE SMOKED HADDOCKS, superior to Finddons—Choose haddocks of two or three pounds weight, take out their *gills*, *eyes*, and entrails; and remove the blood from their back-bone, wipe them dry, and put some salt into their bodies and eye-sockets, lay them on a board for a night; and in the morning, dip them for a second or two in the impure wood-acid, and hang them up to dry, and in a few hours they will be fit to be eaten.

285. To prepare Smoke-dried Salmon by Pyro-Ligneous Acid—Put the fish down, take out the inside and roe, take off the scales and rub it with common salt, hang it up for twenty-four hours, to drain, take three or four ounces of refined nitre, *(saltpetre)*, accord-

ing to the size of the fish, two ounces bay salt, and as much coarse sugar; mix all well together, and rub them well into the salmon, lay it in a large dish for two days; then rub it again with common salt, drain and wipe it well, and after twelve hours, dip it in pyroligneous acid; then hang it up to dry, keeping it open with two small sticks.

286. TO SMOKE-DRY AND PRESERVE COD FISH.—These fish to be fit for preserving, should be thick, at the neck, the flesh white and firm, the *gills* very red, and the eyes bright and fresh. Take the lower half of the fish, and proceed with it as with the salmon, (par. 285), and it will be done.

287. TO PREPARE BOLOGNA SAUSAGES BY WOOD-ACID.—Cut into small pieces, four pounds of lean beef, add to it one pound of suet, and one pound of bacon, both the suet and the bacon to be cut into small square pieces in the form of dice; season with all-spice, pepper, bay-salt, saltpetre, and a little powder of bay leaves; mix the whole together, and put the meat into skins about the thickness of the wrist, dip them into the *wood-acid,* or wrap them into a wetted cloth, which has been dipped in the acid, and dry them the same as tongues, (see 282); this process may be improved, by dipping the meat in the acid, and allowing it to dry before cutting it up to put in the skins.

288. TO PREPARE A SMOKED BEEF-HAM BY PYRO-LIGNEOUS ACID.—Form your leg of beef like a ham, and for every fourteen pounds weight, take a pound of salt, one pound of raw sugar, one ounce of saltpetre, and one ounce of bay-salt; put it into the meat, turn and taste it every day, and let it lie a month in the pickle; take it out, dry it, dip it in the wood-acid, roll it in bran, and hang it in a dry place.

289. OBSERVATIONS ON THE VALUE OF PYRO-LIGNEOUS ACID IN THE ARTS, AND AS AN ANTI-SEPTIC, THE GRAND AND BEST PRESERVATIVE OF ANIMAL SUBSTANCES FROM DECOMPOSITION, THEREBY SECURING TO MAN, AT ALL TIMES, IN EVERY COUNTRY AND CLIMATE, *(in a sound and healthy state)*, ONE OF THE FIRST NECESSARIES OF LIFE.—Pyro-Ligneous Acid is applied in the Arts, to the manufacture of White Lead, Sugar of Lead, in dyeing as a solvent of iron, in Anatomy as a preservative of Anatomical preparations; Mr Slortze, Apothecary, of Hall, has with it converted several bodies into *Mummies*, and Dr. Jorg, a Prussian, has for a long time past been doing the same, and which are supposed to be equal in preservation even to the Egyptian, which (according to Mr G. Belzoni) have ceased to be human for at least 3000 years, *and which are still in a perfect state of preservation.* I saw one myself lately, at Paris, which was ticketted on the breast as being 2000 years old, it was in a perfect state of preservation—how those who ticketted it came to know its age, I know not, but I think their reasons for ascribing

that age to the Mummie should have been prefixed also. What is to hinder Dr. Jorg from making *Egyptian Mummies,* as well as you and I making smoke-dried hams and tongues, that never were exposed to smoke.

As it will require another number, to complete what I have to communicate on Pyro-Ligneous Acid, and its uses, I will be very thankful to any person who can submit to me any *useful knowledge for the people,* respecting this Acid, and the purposes it may be applied to.

290. FRENCH POLISH.—Dissolve in a gentle heat, three ounces of shell-lac, one ounce of gum mastic, and one ounce of gum sandarac, in forty ounces (2½ lbs.) of spirit of wine. This also requires *elbow-grease,* as well as 206, part first.

291. ROMAN POLISH.—Dissolve three pounds of gum sandarac, in two gallons of spirits of wine.

292. WHITE VARNISH.—Dissolve one ounce of gum sandarac, and one ounce of gum mastic, in a gill of spirits of wine.

293. BROWN VARNISH.—Take one ounce shell-lac, and one ounce seed-lac, and dissolve both in two gills spirit of wine.

294. YELLOW VARNISH.—Dissolve one ounce of seed-lac, and one ounce of gum sandarac, in two gills of spirits of wine.

295. TO MAKE BRITISH POLISH.—Take one ounce of seed-lac, and one ounce of gum elemi, and dissolve them in two gills of spirits of wine.

296. POLISHING VARNISH.—First polish with water and rotten-stone, afterwards with chalk and sweet oil.

297. TO MAKE ROCHELLE SALTS—WHICH SELL @ 1s. ⅌ OUNCE, OR HIGHER, WHEN STAMPED AND IN PACKAGES.—Mix fourteen ounces of soda, with twelve ounces of cream of tartar, and you have the best *Rochelle Salts,* at 8d. per pound.

298. BEST BAKER'S BARM.—Take of ground Malt, four pounds, and *mash* or mask it, in summer at 68°, and in winter at 105°, with two and a half gallons of water; two ounces of *hops* must be boiled in the water you mask with, and the whole must be fermented with one pound of good brewer's yeast, this barm keeps fresh a week, when it must be renewed, and the same does to ferment again with.

299. TO HARDEN QUILLS.—In order to harden a quill that is soft, thrust the barrel into hot ashes stirring it till it is soft, and then taking it out press it almost flat upon your knee with the back of a penknife, and afterwards reduce it to a roundness with your fingers. Another method to harden quills, is by setting water and alum over the fire, and while it is boiling put in a handful of quills, the barrels only, for a minute, and then lay them by.

300. TO FUMIGATE FOUL ROOMS.—To one table-spoonful of common salt and a little powdered manganese in a glass cup, add at four or five different times a quarter of a wine glass of strong vitriolic acid. At every addition of the acid, the vapour will come in contact with the malignant miasmata, and destroy them.

Note. The vapour given out by this mixture, at every addition of the acid, is *chlorine,* (see 104, 105, 106, part 1st) it ought therefore to be avoided, when produced in a room, as it is very detrimental to the lungs, although it be eminently useful in destroying malignant effluvia.

301. BAIT FOR MAKING FISHES COME TO THE LINE.—Take two grains of musk, four drops of the oil of spikenard, or *Lavender-Spike,* as much camphor, rub all together, and rub your hook and bait with a little of the preparation, to allure the fishes, and proceed to fish as usual, when all the fishes in your neighbourhood will come to your line.

302. TO MAKE MASTIC VARNISH.—Dissolve one part of pure gum mastic, in four parts of alcohol, (spirit of wine).

303. BLACK VARNISH—is formed by adding fine lamp or ivory black to *Mastic Varnish.*

304. TO STAIN WOOD RED.—To stain wood this colour, it is necessary to be immersed some time in a solution of sulphate of alumina and potass, (*common alum*), and afterwards put it into a decoction of Brazil-wood in lime-water.

305. TO STAIN WOOD BLUE.—Make a solution of indigo in sulphuric acid, *(vitriol),* and having dilutted this solution, steep the wood in it till it have acquired the shade required.

306. TO STAIN PAPER YELLOW.—Make an infusion of *turmeric root* in spirit of wine, and dip your paper in it, it produces a most beautiful yellow, without injuring the texture of the paper.

307. TO STAIN PAPER A PERMANENT YELLOW.—Make a decoction of French berries with sulphate of alumina, *(common alum),* and proceed as in 306, you will have your paper dyed a permanent yellow.

308. TO STAIN OR DYE PAPER A PERMANENT YELLOW BY MEANS OF CHROMATE OF POTASS.—First make a solution of acetate of Lead (*common sugar of lead*) in this mordant, let your paper be wetted then dried, next let it be immersed in a solution of chromate of Potass, and dry it, and it will be dyed yellow.

309. TO SPOT A WHITE HORSE WITH BLACK SPOTS.—Take of litharge, three ounces; quicklime, six ounces; beat them fine, and mix them together, put the mixture into a pan, and pour a sharp lee over it; then boil it, and a fat substance will swim at the top, with which anoint the horse in such places as you design to have black, and it will turn of that colour immediately.

Note. This receipt is from "Smith's School of Arts."

310. TO STAIN WOOD JET BLACK.—Strike your wood over with oil of vitriol, hold it over a coal-fire, and repeat this until it is black enough; then polish it with shoemaker's heel-ball.

Note. This is the most simple, and best way to finish frames for pictures.

311. TO MAKE PEWTER.—Melt, in a crucible, one part of lead, or bismuth, with about twenty parts of tin.

312. TO INNOCULATE CHEESE, TO GIVE NEW CHESEE THE TASTE, QUALITIES, AND APPEARANCE OF OLD CHEESE, AND AT THE SAME TIME TO IMPROVE AN OLD CHEESE.—Take two steel half-cylinders, with which cheese-dealers try their cheese, and let them be of the same size, thrust one into the new cheese you wish to innoculate, and turn it round and draw out the steel, with the cylinder of cheese in it; insert the other steel the same length into the old cheese, and turn it round and draw it out, with the cylinder formed piece of old cheese into it; introduce this steel with the cheese in it, *untouched*, into the new cheese, then put your finger to the crust of the cylinder of old cheese and draw the steel out,—do the same with the steel containing the new cheese, viz. —insert it into the old cheese, and rub both the external wounds with butter, so as to exclude air.—Make as many repetitions of the innoculation as shall suit your taste, and let the new cheese lie some time till it ripen.

313. TO MAKE METAL SPOONS WHICH MELT IN HOT WATER.—Dissolve together eight parts of bismuth, five of lead, three of tin, and one of mercury, these metals will form an alloy that will melt in boiling water.

314. TO FORM INDIAN WHITE FIRE.—Take one part of the sulphurett of arsenic, four parts of sulphur, and twelve parts of nitre, (saltpetre); mix these ingredients all well together, and press the mixture firm into a paper case, or any other convenient vessel, and set fire to it; it will produce a splendid white light.

315. TO MAKE HORN SOFT.—Take one pound of wood-ashes, two pounds of quick-lime, one quart of water; let it boil together to one third; then dip a feather into it, and if in drawing it out the plume comes off, it is boiled enough, if not, let it boil longer; when it is settled, filter it through a cloth; then put in shavings or filings of horn, let them soak therein three days, and anointing your hands first with oil, work the horn shavings into a mass, and print, mould, or form it in what shape you please.

316. TO CAST HORN INTO MOULDS.—Take horn shavings and lay them into a new earthen pot; take two parts of wood-ashes, and the third part of lime, pour clear lee upon it, so as to cover it all over, boil it well, stir it with an iron ladle, till it has the consistence of a paste; if you will have it of a red colour, then take red lead, or vermillion, as much as you think proper, and temper it with the paste; then cast it into a mould, and let it dry;

and you may smooth it with a knife, and it will be of one solid piece; you may in this manner give horn what colour you please.

317. To cast wood in moulds, as fine as Ivory, of a fragrant smell, and of several colours.—Take fine saw-dust of *lime-tree wood*, put it into a clean pan, tie it close up with paper, and let it dry by a gentle heat; then beat it in a stone-mortar to a very fine powder, sift it through cambric, and lay it, if you don't use it presently, in a dry place, to keep it from dust.

Then take one pound of fine parchment glue, the finest gum tragacanth and gum arabic, of each four ounces; let it boil in clear pump-water, and filter it through a clean rag; then put into it the said *powder of wood*, stir it till it becomes of the consistence of a thick paste, then set it in a glazed pan in hot sand, and stir it well together, and let the moisture evaporate till it be fit for casting. Then pour or mix your colours with the paste, and put in oil of cloves, roses, or the like to give it a scent; you may mix it if you will, with a little beaten amber; for a red colour use brazil ink, and for other colours, use your discretion. Pewter or brass fits better, than plaister of Paris for moulds; anoint them over with oil of almonds, and put in your paste, let it stand three or four days to dry and harden, then take off your mould, and the designs will be a hard as ivory; you may cut, turn, carve, and plain them like other wood; they will be of a sweet scent, and you may, if your moulds will allow it, use several colours in one piece, leaving only in some parts the natural colour of the wood, in order to convince the beholders what it is. It is a fine and curious experiment.

318. TO CAST MEDALS IN BRIMSTONE.—Melt half a pound of brimstone over a gentle fire, with this mix half a pound of fine vermillion, and when you have cleared the top, take it off the fire, stir it well together, and it will dissolve like oil; then cast it into the mould, after being first anointed with oil, let it cool, and take it out; but in case your figure should change to a yellowish colour, you must only wipe it over with aquafortis, and it will look like the finest coral.

319. To make a curious Drinking-Glass.—Take two smooth drinking-glasses, fitted close to each other, so that the brims of both may be even; then paint on the inside of the larger glass with oil colours, what you will; and when dry, you may with the point of a needle open fine veins or other embellishments, &c. Then oil it all over with old linseed oil, and before it is quite dry, whilst clammy, lay leaf gold upon it, press it close down to the glass with cotton, and let it dry thoroughly. The mean while take the other lesser glass, and lay a thin clear varnish on the outside thereof, and when almost dry, lay on leaf gold, and the inside of the glass will look all over gilded. When this is dry, put it into the larger glass, and make a paste of chalk and lac varnish, with this lute the rims of the two glasses, so that it may not be perceived, but look as if it were made out of one piece.

Stuart's Useful Information for the People, No. 17;

Being No. 9, of the

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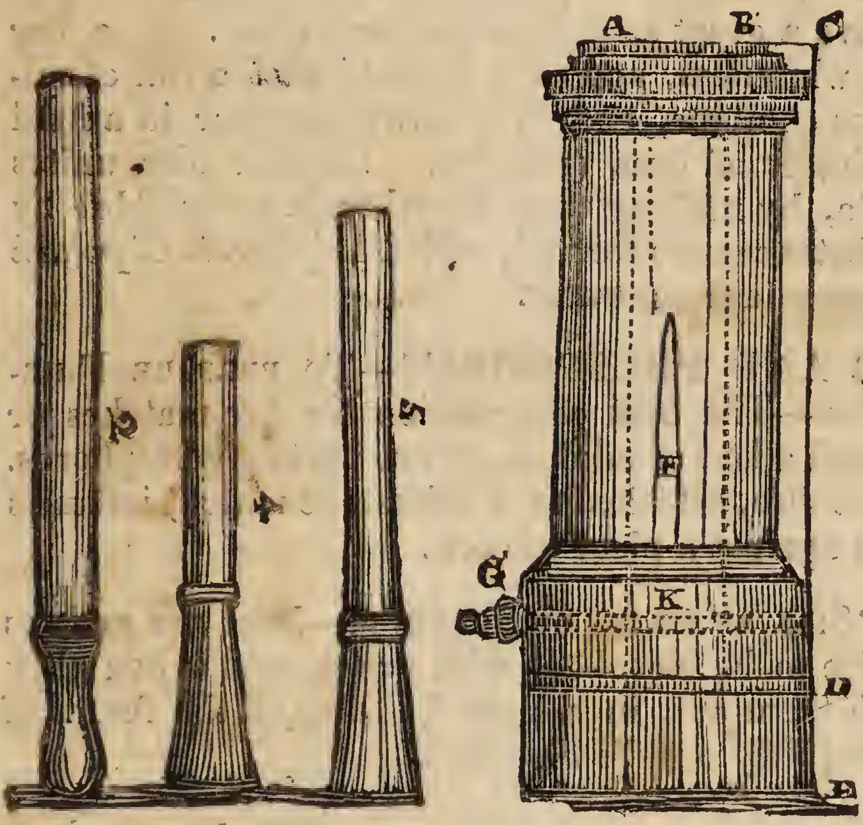
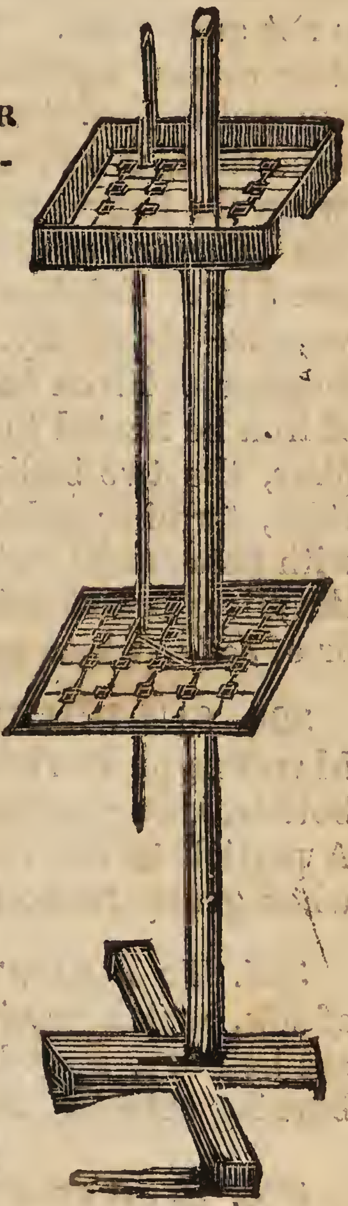


320. A ROCKET MOULD WITH RAMMERS FOR RAMMING OF ROCKETS, AND A ROLLER FOR ROLLING THEIR CASES ON.



321. A GIRANDEL CHEST FOR FIRING ROCKETS.

322. OF CARBON—CHARCOAL.—To obtain charcoal perfectly free from contamination; pieces of oak, willow, hazel, or other woods, (see 272), deprived of their barks, must be buried in sand, in a crucible, which is to be exposed, covered, to the heat of a wind furnace; but charcoal is now most commonly prepared in the large way, (*in this country*), by the distillation of wood in iron cylinders, when that valuable product, impure vinegar, called *Pyro-ligneous Acid*—ACID FROM WOOD BY FIRE—is obtained. (See 276).

323. OF SULPHUR—BRIMSTONE.—Sulphur, known also by the name of *brimstone*, is a mineral substance, frequently found pure in nature. It is of a pale yellow colour, without taste, and also without smell, except when heated. It is chiefly a volcanic product, and a great deal of what is used in this country is brought from Italy and Sicily. It is found also in nature combined with most of the metals as *ores:* and united to iron, it forms *iron pyrites.* Sulphur is extracted from these *pyrites,* by exposing them to heat in tubes, by which the sulphur is driven out and received in vessels with water; and, when melted and poured into moulds, it constitutes the *roll sulphur* in common use. The sulphur thus obtained, is not quite pure. To purify it, it is sublimed by a gentle heat in close rooms, and thus is formed *flowers of sulphur.* If sulphur be exposed to heat it will soon fuse, and, by continuing the fusion for some time, it will become thick and tenacious; and, if worked between the fingers under water in this state, it acquires a consistency like wax, and may be employed in taking casts for seals or gems, (see 318). Sulphur becomes electric by friction, and then exhibits *negative* electricity. It unites to phosphorus by means of heat. Sulphur and iron have a great attraction for each other. If a bar of iron be heated to whiteness, and then touched with a roll of sulphur, the two bodies combine, and drop down together in a fluid state, forming sulphuret of iron, (see 48). Sulphur also unites with potash and soda, by melting them together in a crucible: by this, liver-brown substances are formed, called *sulphurets* of *potash* or of *soda,* which are soluble in water.

324. SULPHUR AND PHOSPHORUS—TO PREPARE FIRE-MATCHES OR BOTTLES.—The best composition for fire-matches or bottles, is one part and a half of sulphur, to two parts of phosphorus. A particle of this mixture, attached to a brimstone match, inflames when gently rubbed against a piece of cork.

325. TO BLEACH SILK BY MEANS OF SULPHUR.—Wet the articles of silk, which require to be bleached, with water, and when they are half dry, stretch them out, in a close box-full of the fumes of burning sulphur, and they will be bleached.

326. BLEACHING OF WOOLLEN BY SULPHUR.—Wash and clean the stuffs to be bleached thoroughly, in river water, and then put them to dry on poles or perches; when they are half dry, stretch them out in a very close stove, in which sulphur is burning, the vapour of the sulphur will diffuse itself therein, and by degrees adhere to the stuff, and give a fine whitening. This is called Bleaching of *Paris,* or Bleaching by the *Flower.*

327. TO DEPRIVE A RED ROSE OF ITS COLOUR, AND TO RESTORE ITS COLOUR AGAIN.—A pleasing instance of the bleaching powers of burning sulphur may be witnessed, by placing a red rose in the pipe of a funnel, and inverting the funnel over some burning sul-

phur, when the red colour will be discharged, and the rose will become white or beautifully variegated. If it be now dipped into water, its redness, after a time, will again return.

328. TO BLEACH STRAW AND STRAW-BONNETS, BY MEANS OF THE VAPOUR OF BURNING SULPHUR—SULPHUROUS ACID.—Let the straw or straw-bonnet be well washed, and when about half dry, suspend it in a close box, in which sulphur is burning, and it will become white and clean.

329. NITRE—NITRATE OF POTASH—SALPETRE—(See 183, Part First)—This salt promotes in a very powerful manner the combustion of inflammable substances, when from two to three parts of it are mixed with one of charcoal, and set fire to, the mixture burns rapidly, and azote (*nitrogen gas*) and carbonic-acid gas are given out; and three parts of nitre, two of sub-carbonate of potass, and one of sulphur, mixed together in a warm mortar, forms *fulminating powder* or *thunder powder*, (see 95); and mixed with sulphur and charcoal, form gunpowder, (see 204).

330. POWDER OF FUSION.—TO FUSE A PIECE OF COPPER, SAY A FARTHING, IN A WALNUT SHELL, WITHOUT BURNING THE SHELL.—Take three parts of nitre, one of sulphur, and one of fine saw-dust, mix them well together, and fill a walnut shell therewith, then put the farthing into the powder and set fire to it, and the metal will be found dissolved into a button of the sulphuret of copper.

331. NITRATE OF SODA—is prepared by saturating nitric acid with soda, and evaporating till crystallization takes place. Professor Proust says, that five parts of it, with one of charcoal, and one of sulphur, burns *three times!!!* as long as common powder; it is therefore an economical composition for fireworks.

332. TO MAKE TWO POUNDS OF GUNPOWDER FOR 6½d., SUITABLE FOR FIREWORKS.—Take one pound and a half of nitre at 4d a-pound, and five ounces of charcoal, at say ¼ of a penny, and three ounces of sulphur, which will cost another farthing; let these ingredients be well powdered and mixed together in a wooden mortar, and proceed as directed for making gunpowder, (see 204), and you will have it of *military strength.*

Note. It is commendable to powder each of the ingredients well, *separately,* before mixing them.

333. OF THE PREPARATION OF THE SEVERAL INGREDIENTS FOR MAKING FIREWORKS.—The principal ingredients in the composition of *fireworks,* are gunpowder, saltpetre, sulphur or brimstone, and charcoal; with respect to each of these articles, great care should be taken to procure them of good quality, otherwise your *fireworks* will fail of having their desired effect. The nitre (*saltpetre,* see 183, 329) ought to be pure; the sulphur of a high yellow colour, and should crackle and bounce when held tightly in the hand, and the

charcoal ought always to be soft and well burnt, and it is necessary to observe, that the smaller the quantity of *sap* contained in the wood before it is burnt, or made into carbon or charcoal, the better will be your gunpowder, (204, 332), and also your fireworks; it was from a knowledge of this circumstance, that the French and Germans beat *us* at *long shot* for many years, till a Dr. Watson made the discovery, and communicated the fact to our Government. The charcoal should also be kept in close boxes or bottles, from the influence of atmospheric air, until the time of its being required for use.

334. HOW TO MEAL GUNPOWDER FOR FIREWORKS.—There have been many methods practised to reduce the grain of gunpowder to dust, in order to fit it for the formation of fireworks, such as wooden mortars and pestles of ebony and other hardwoods; because, stone or metal mortars are inadmissable, for (the plain reason) by percussion with the pestle, the whole of the powder might be set fire to, and serious results might be the consequence; therefore wooden implements, to reduce it to powder, has been had recourse to; but a contrivance far superior to the pestle and mortar, is the *mealing table* and *muller*, it is made of *elm*, but the muller is made of ebony. Upon this mealing table you put a portion of powder, and with the muller you rub (like a painter grinding paint) till all the grains are broken down; then sift it through a lawn sieve, that has a receiver at the bottom to catch the fine powder, and a top to prevent the dust from flying about, like those used in sifting sugar for lozenges and other powders by confectioners and druggists; that which does not pass through, must be returned to the mealing-table to be reground, till all pass through the sieve.

335. TO GRIND BRIMSTONE AND CHARCOAL FOR FIREWORKS.—Proceed just as in Experiment 334, but as there is no danger of explosion, a stone muller or a metal mortar may be used, and the whole must be passed through the sieve.

336. OF MIXING THE SEVERAL INGREDIENTS.—The performance of the principal part of fireworks depends much on the composition being well mixed, therefore great care ought to be taken in this part of the work, particularly in the composition for *sky-rockets*. First put the different ingredients together; then work them about with your hands, till you think they are pretty well incorporated; after which put them into a fine sieve, and if, after it is sifted, any remains that will not pass through the sieve, grind it again till fine enough. Common works are not so material, nor need they be so fine. But in all fixed works, from which the fire is to play regular, the ingredients must be very fine, and great care in mixing them well together; and observe, that in all compositions wherein are steel or iron filings, the hands must not touch: nor will any works which have iron or steel filings in their charge, keep long in damp weather, without being properly prepared.

337. To make the Moulds for Rockets.—Rockets bearing the pre-eminence, and being the principal things belonging to a firework, it is requisite to give some definition of them, how they are made, finished, and fired; in order to do this, I shall first endeavour to give some idea concerning the moulds they are formed in; these are turned, commonly of some close and hard wood, such as white plumb-tree, box, chesnut, cypress, juniper, Indian wood, &c. Others are made of ivory, and for rockets of extraordinary large sizes, they are cast in brass or copper, and turned in the inside in a nice manner, the foot or basis with its cylinder, wart, or half bullet, in these, as in others, may remain of solid wood. The whole is commonly turned in the size and form of a column in architecture, and embellished with ornaments according as you fancy, (see fig. 320).

338. Description of the Rocket Mould, 320.—The figure A, B, C, D, E, F, G, K, represents a rocket mould with its basis, cylinder, bore, and pieces; A, B, is the interior diameter of the *mould;* C, D, the height of the mould; being seven diameters or seven times A, B, —from D to E is the height of the breech at bottom, which stops the mould when the rocket is driving, and this is *one diameter* and *one third:* upon this bottom you have a solid cylinder, whose height is one diameter of the orifice, A, B; this cylinder is crowned with a half-bullet, in which is fixed an iron or copper piercer, F; G is an iron pin that keeps the bottom and cylinder together. 2 is the roller on which the paper is rolled for the mould. 3 is the first or longer rammer, and 2 is the shorter.

339. Of Girandel Chests, for firing Rockets from, (see 321) —The girandel chest is formed of wood, as in the figure, with holes adapted to each other, so that your rockets may hang perpendicular, or at any angle you please, at firing them, and they are generally fitted to the number of rockets designed to be fired at once.

340. To Bore Rockets, or Ram them over the piercer.—Since boring of rockets is one of the principal things belonging to them, in order to their operating well, the bores are to be made in proportion to the size of the rockets; some of them are bored tapering to a point; others are hollowed square, running also to a point; and others are rammed over a round piercer, which is fixed in the wart of the rocket mould, (see fig. 320, F) and stands perpendicular, running tapering to a point. The stronger the charge of the rockets, the narrower should be the bore, and the weaker the charge, and deeper and wider; for if a strong charge is bored too deep, it will break in ascending, and if it is bored too little, and the charge slow, it will fall to the ground without any effect: they are commonly in middling charges bored two-thirds of the tube from the neck.

341. Charges for Sky-Rockets.—Take of meal powder half a pound, and of charcoal half an ounce.

342. Or, meal powder five ounces, and charcoal half an ounce.

343. Or, meal powder eight ounces, and charcoal one ounce.

344. Or, meal powder six ounces, saltpetre half an ounce, brimstone a quarter of an ounce, and charcoal one ounce.

345. To try your Charge for Sky-Rockets.—Sift a little of your charge on a table, and set fire to it, and if it burns away in an even fire, and does not fly up, it is a sign it is wrought enough; but if it at one place burns quicker than at another, or stops in its course, then you must grind it more.

346. To try your Rockets, and how to Remedy the Defects.—Having rammed a rocket for trial, fire it in a secure open place, from your *girandel chest;* if it mounts even and high, and gives a report as soon as it turns, it is a sign of being made to perfection; but if the rocket burst as soon as it is lighted, then the charge is too fierce; or if it rises a little, and falls back, then the charge is foul and weak; the former is rectified by adding more charcoal, and the latter by some meal powder; for the rest it must be observed, that the larger the rockets are, the weaker must be the charge; and on the contrary, the smaller they are, the stronger must be their charge.

347. To produce beautiful Fireworks in Miniature, which shall imitate Sky-Rockets—Fixed Stars—Aurora Borealis—Illuminated Clouds of Fire—a splendid Hemisphere of Stars—and lastly, the Phenomenon of Shooting Stars.—Put half a drachm of solid phosphorus into a large pint Florence flask, holding it slanting, that the phosphorus may not break the glass: pour upon it a gill and a half of water, and place the whole over a common tin lamp, filled with spirits of wine; light the wick, which should be about half an inch from the flask; as soon as the water is heated, streams of fire will issue from the water, by starts, resembling sky-rockets; some particles will also adhere to the sides of the glass, and will represent stars, and will frequently display brilliant rays. And thus continue for some time till the water begin to simmer, when immediately a curious aurora-borealis begins, and gradually ascends, till it collects into a pointed flame: when it has continued half a minute, blow out the flame of the lamp, and the apex that was formed will rush down, forming beautifully illuminated clouds or fire rolling over each other for some time, which disappearing, a splendid hemisphere of stars presents itself. After waiting a minute or two, light the lamp again, and nearly the same phenomena will be displayed as from the beginning. Let a repetition of lighting and blowing out the lamp be made for three or four times at least, that the stars may be increased. After the third or fourth time of blowing out the lamp, the internal surface of the flask is dry, and many of the stars will shoot with great splendour from side to side, and some of them will fire off with brilliant rays, and

these appearances will continue for several minutes. What remains in the flask will serve for the same experiment three or four times, without adding any more water. Care should be taken after the operation is over, to lay the flask and water in a cool and secure place.

348. A Composition for Stars of a Beautiful Colour to put in Rockets, (see also 268)—Take of saltpetre two ounces, sulphur-vivum two ounces, and camphor one half of an ounce; beat these all very fine, and mix them together, making them into a paste with a little turpentine or linseed oil, and form them into small balls the size of pease, which, roll in meal powder, and put two or three dozen of them into a firework—say a rocket.

349. To make an Explosion in imitation of Gunpowder.—Take a few iron filings, and put them into a bottle, and proceed, (see 4); then hold a stout phial about a minute over the mouth of the bottle; then take it away, and hold its mouth to a lighted candle, and it will explode, (for explanation, see 25, 29).

350. Reference to Fireworks.——

	Paragraph
To make Bengal Lights, ...	94
A Chinese Light, ...	202
To make Gunpowder, ...	204
To make Powder for Fireworks, ...	205
To make a Red-Fire for Theatres, ...	247
To make a Green Fire, ...	248
To set Fire to Fireworks, ...	264
Composition for Stars, to put in Rockets, Serpents, Blue Candles, Water Rockets, or other Fireworks, ...	268
To make a Roman Candle, ...	269
To form Indian-White Fire, ...	314

The above enumeration will serve as a guide to those who may feel inclined to turn their attention to the amusing recreation of preparing fireworks. I had a wish, in this number, to have finished the subject of fireworks; but, as without Engravings to illustrate the subject, I find it would be difficult to make it clearly intelligible; and as it would require two or three numbers, to give but a clear *glimpse* of the subject, I shall defer saying more, till the illustrative engravings are ready.

351. TO PREPARE A ROOM OR CLOSET, IN SUCH A MANNER, THAT ANY ONE ENTERING WITH A LIGHTED CANDLE, WILL THINK HIMSELF SURROUNDED WITH FIRE.—Take a pretty large quantity of brandy, and put it in a bowl; set it on a slow coal fire, to receive heat enough to boil gently up; into the brandy fling some camphor, cut into little pieces, which will soon dissolve, and when all is dissolved, close both windows and door, and let the brandy boil and evaporate, by this the whole room will be filled with the vapour of camphor and spirits, which, as soon as a candle is brought in, will be lighted and seem as if all was fire. If some perfume is dissolved in the brandy, the flame will be attended with a fine smell.

352. LUCIFER MATCHES.—*Reply to Correspondent, "Beelzebub"* —The Editor cannot understand how "*Beelzebub*" did not succeed in the preparation of the Lucifer Matches, as nothing more is required in their preparation, than to mix the Chlorate of Potash, and Sulphuret of Antimony, (both previously finely powdered) together in a little of the solution of glue, or gum-water, and dip common brimstone matches therein, dry them, and Lucifers, of Beelzebub's own preparing, will inflame without fail, on drawing them through a piece of sand-paper, (as directed 142, 263).

Note. It is rather too bad for a person who has only purchased a *penny tract* to put the publisher to two-pence of expense of postage, for such stuff as Beelzebub's letter is composed of.

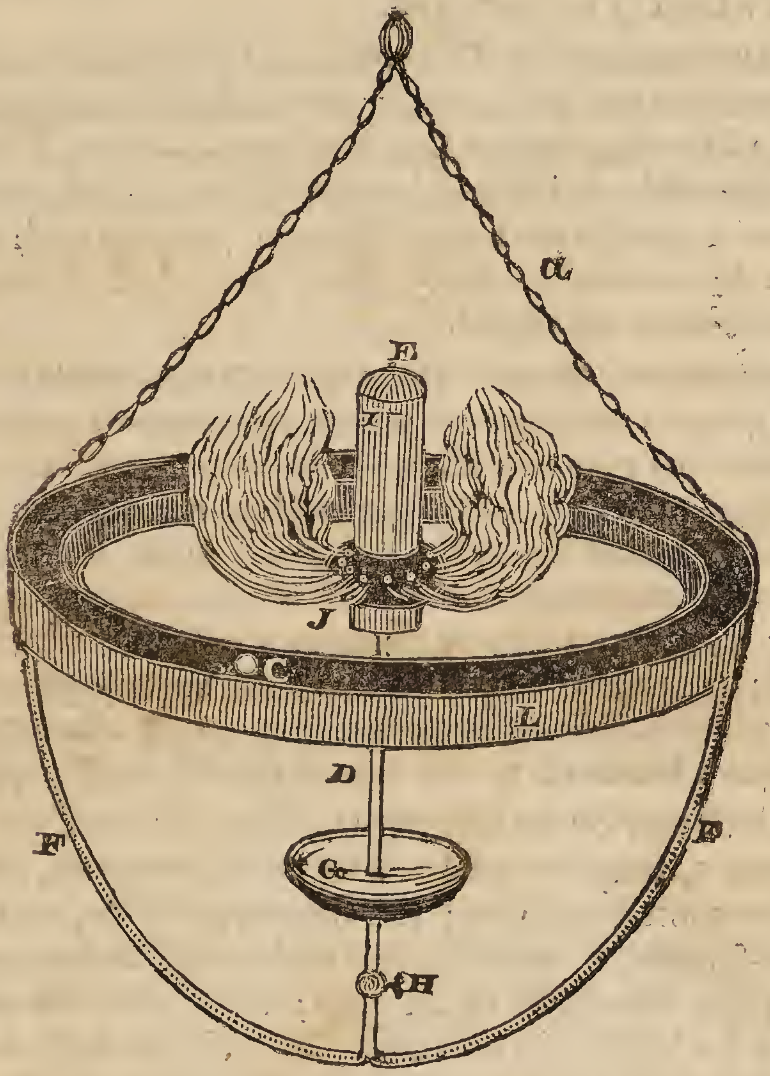
353. NITRIC ACID.—*Reply to Correspondent, L. C.*—L. C. is informed, that 184 gives distinct information how to prepare Nitric Acid; put the purified Nitric into the retort, A, by the stopper, F, (see fig. 167). The retort is glass, and may be had at a glass house. Apply a gentle heat, either by a charcoal fire in a chaffer, or else set the retort in a sand-bath, (as seen in the figure), and the acid will pass over into the receivers, D, D, D, which may be made of glass or delf-ware. The way to know the strength will be learned in some future number of this work,—namely, when treating of specific gravity.

Stuart's Useful Information for the People, No. 19,

Being No. 10, of the

CHEMICAL EXPERIMENTALIST.

354. A NEWLY INVENTED AMERICAN (SELF-PREPARING) PORTABLE OIL-GAS LAMP.



355. THE COMPARATIVE ILLUMINATING POWER OF OIL AND COAL-GAS.—According to some, the illuminating power of oil-gas, in comparison to coal-gas, is as three and a half to one; therefore, 1000 feet of oil-gas should give as much light as 3500 feet of gas from coal. Dr. Ure says, one cubic foot of oil-gas will go as far as four feet of coal-gas; if such be the case, 250 cubic feet of oil-gas is equal to 1000 cubic feet of coal-gas.

356. COMPARATIVE COST OF OIL AND COAL-GAS.—1000 cubic feet of coal-gas is generally sold about 10s., therefore to find out the comparative value of this gas with that made from oil; all that is necessary, is to find out how much oil it will require to produce gas, which shall produce light equal to 1000 cubic feet of coal-gas, and as one foot of oil-gas gives as much light as four of coal-gas, 250

feet of oil-gas will be equal to 1000 of coal, and as one gallon of oil will produce from 100 to 120 feet of gas, it follows, that at the lowest calculation, two and a half gallons of oil will produce gas-light equal to 1000 feet of coal-gas; and allowing the oil to be 2s. a-gallon, it follows, that oil-gas will cost just one-half the price of coal-gas.

357. ADVANTAGES OF OIL-GAS.—It does not contain sulphur—it wants the suffocating smell of coal-gas—it does not injure plate, pictures, nor paint—it does not require the costly and offensive operation of purifying by lime—and it does not injure the metal of the pipes in which it is conveyed.

358. DISADVANTAGES OF COAL-GAS.—It contains sulphur, and is thereby contaminated with sulphuretted-hydrogen-gas—a gas very pernicious to life when taken into the lungs—when it escapes, it has a suffocating smell—it injures books, plate, paint, and pictures—and requires a costly and troublesome process and apparatus for purification, by means of lead, lime, &c., and it does injure the pipes in which it is conveyed.

359. DESCRIPTION OF THE PORTABLE (SELF-PREPARING) OIL-GAS LAMP, (354).—*a* is a chain by which the lamp is suspended, L is a circular cistern to contain a supply of oil, C is a hole whereby the cistern is supplied; F, F, oil-pipes which convey the oil from the cistern to the common upright supply pipe; H, a stop-cock wherewith to regulate and stop the supply of oil between the cistern and *gas-former;* G, a small cup to contain alcohol, by which the gas is first started; D, the common upright oil supply-pipe; E, the gas-former and argand, which serves the part of *Retort,* Gasometer, and also argand burner; I, the top of the oil supply-pipe.

360. DIMENSIONS OF THE SEVERAL PARTS OF THE OIL-GAS LAMP.—The cistern, L, may be made of tinned sheet-iron, and the pipes, F, F, H, of common gas-pipes; the oil supply pipe, D, from the cup, G, to the gas-former, E, must be two and a half inches, and the diameter of that pipe one-eight of an inch; from the bottom of the gas-former, F, to its top, E, is two and one-eight inches, and the diameter of its upper part at J is one-half of an inch and one-sixteenth; of the argand below, three-fourths of an inch, and the supply-pipe reaches within one-quarter of an inch of the top of the gas-former, as seen in the figure; it may be said that the gas-former is the whole affair, it is made of silver, and is pierced with small holes for jets all round the circumference of the larger circle; it has been remarked to me, that a ring of platina, or in fact, a burner made altogether of platina would be preferable to silver; because it would not so soon be out of order; and with these remarks I perfectly agree;—moreover, for the reader's satisfaction, I have seen the lamp burning, and will also exhibit it, burning, in my lectures upon this subject; therefore the portable *Gas-forming* Lamp is no chimera, any more than a *Steam Coach.* Every farmer and cotter may now have his gas-light at his *ingle* side, and with less trouble than a common oil-lamp.

361. *Outline of Dr. Ure's Lecture on Chemistry, Jan.* 31*st* 1826. —FLOWERS OF SULPHUR IS SULPHUR SUBLIMED.—Sulphur is capable of combining with all elementary bodies. A heat of 220° melts sulphur as thin as water, boiling oil will also melt it. To take impressions of coins with sulphur, the sulphur is to be kept some time melted, till it becomes viscid, then pour it on the coin, in concreting, it expands, and thereby takes off the finest image, (see 318). Sulphur melts with a moderate heat, but raise the heat, and it becomes solid—in cooling, it retraces its steps. It is twice as heavy as water. It may be conveniently melted in the bottom of a florence flask. Impressions taken with wax may be bronzed with red lead or vermillion. The chemical miniature apparatus for bleaching or blanching silk, cotton, violet and rose leaves, straw-bonnets, &c. is merely a glass bottle without the bottom, set fire to a little sulphur and set the glass over it, and insert into the neck of the bottle a little wire-gauze bag, in which you have put the article to be bleached. Sulphur dissolves in oxygen, and forms sulphurous acid. Sulphurous acid is composed of equal parts sulphur and oxygen. Sulphuretted hydrogen (see 46) is easily obtained from pyrites, which is sulphuret of iron; but we may prepare sulphuret of iron as follows —Melt iron filings and sulphur together in an iron laddle, and sulphuret of iron is formed, (see 48). Pour on sulphuret of iron sulphuric acid and we obtain sulphuretted hydrogen,(see another way to prepare it, 46), it is a test for all metallic poisons: it blackens sugar of lead, thereby detecting its presence, (see Sympathetic Ink, 50). If a piece of paper is wrote on with a solution of sugar of lead, and put into the middle of a book, and the book tied with a cord, and laid on the mouth of a dram glass containing a little sulphuret of iron and oil of vitriol; the gas evolved will cause the writing to become visible, (see 51). We can impregnate water with this gas by Woulf's apparatus, which shall possess all the properties of Harrowgate and Moffat waters, and which is sweet to the taste, (49). Hydrogen does not dissolve in water, sulphur does not dissolve in water, but the compound of *sulphuretted hydrogen* dissolves in it, and thereby we may have sulphuretted water of any strength of a sweet taste. This gas is combustible, and the hydrogen burnt out of it leaves the sulphur on the sides of the bottle. With a solution of arsenic it gives a fine light yellow colour, and with Tartar Emetic it gives an orange precipitate. I have taken the liberty to refer to the paragraph in this work, illustrative of the above lecture.

362. TO MAKE CRACKERS.—Cut some stout cartridge-paper into pieces three inches and a half broad, and one foot long; one edge of each of these pieces fold down lengthwise, rather less than an inch broad; fold the double edge down a quarter of an inch, and turn the single edge back half over the double fold; then open it, and lay all along the channel, which is formed by the foldings of the paper, some meal powder, (334); then fold it over and over, till all the paper is doubled up, rubbing it down every turn; this done, bend it backwards and forwards, two inches and a half, or

thereabouts, at a time, as often as the paper will allow; then hold all these folds flat and close, and with a small pinching cord, give one turn round the middle of the cracker, and pinch it close; then bind it with pack-thread as tight as you can; then in the place where it was pinched, prime one end, and cap it with touch paper. When these crackers are fired, they will give a report at every turn of the paper. If you would have a greater number of bounces, you must cut the paper longer, or join them after they are made; but if they are made very long before they are pinched, you must have a piece of wood with a groove in it, deep enough to let in half the cracker: this will hold it straight while it is pinching.

363. **TO MAKE TOUCH PAPER.**—Dissolve in some spirits of wine, vinegar, or water, a little saltpetre; then take some purple or blue paper, and wet it with the above liquor, and when dry it will be fit for use. When you paste this paper on any of your works, take care that the paste does not touch that part which is to burn. The method of using this paper is, by cutting it into slips, long enough to go once round the mouth of a serpent, cracker, rocket, &c. When you paste on these slips, leave a little above the mouth of the case not pasted; then prime the case with meal-powder, and twist the paper to a point.

364. **PHOSPHORUS**—Atomic weight 12.—For a knowledge of this interesting substance, we are indebted to the Alchemist Brandt of Hamburgh, who in the year 1669, accidentally produced it during his researches after the *philosopher's stone.* It was originally obtained from *human urine,* Gahn, a Swedish Chemist, discovered it in bones, and a French Chemist has lately discovered it in the BRAIN. It exists in our bones in the state of phosphoric acid, (*i. e.* phosphorus combined with oxygen).

365. **PHOSPHORIC ACID.**—Phosphoric acid is a compound of 1 atom of phosphorus, (12), and 2 atoms of oxygen, (16);—its representative number is therefore 28. It is prepared as follows—20 lbs. of bones calcined (burned) to whiteness, and then finely powdered, and then upon this powdered burned bone is poured 20 quarts of boiling water, and 16½ lbs. of sulphuric acid, (oil of vitriol) diluted with an equal weight of pure river water, (these are the quantities recommended by Pelletier, a French Chemist, and they are good proportions). Stir the whole mass together, and let it stand twenty-four hours, then strain, and evaporate to one half in leaden or earthen vessels, over a sand heat,—let it cool, and after standing some time a white sediment will form; decant the clear solution, and boil in a glass vessel till a white dry mass remain—which is phosphoric acid.

366. **TO PREPARE PHOSPHORUS.**—Take of the phosphoric acid, (365), and add to it one half of its weight of powdered *charcoal,* the oxygen (16) of the phosphoric acid, combines with the carbon, (*charcoal),* forming carbonic acid, (see 60, 61); and phos-

phorus, equal in quantity to one-fourth of the acid, rises in a separate state. This process is performed in an earthen retort, and the heat requires to be slowly raised at first, and at length more intense —when the phosphorus will distil over in drops and congeal in the water.

367. SPONTANEOUS COMBUSTION OF PHOSPHORUS IN CHLORINE, (105).—When phosphorus is introduced into a jar of chlorine, it takes fire and burns with a pale flame, and a white solid condenses on the sides of the glass, called the bi- or per-chloride of phosphorus.

368. PHOSPHORUS AND IODINE,—INSTANTANEOUS FIRE TO LIGHT FIREWORKS,—TWO SOLIDS SPONTANEOUSLY BURSTING INTO COMBUSTION BY MERE CONTACT.—Put a few particles of iodine in contact with a few grains of phosphorus, and immediate fire and flame will be the result. Let the phosphorus be dryed previously.

369. TO MAKE PHOSPHURETTED HYDROGEN, (31), MORE PROPERLY CALLED BI-PHOSPHURETTED HYDROGEN.– To prepare this gas, (for its qualities see page 8, paragraph 31), into a retort, filled with a solution of potass, introduce a piece of phosphorus, and apply the heat of a spirit-lamp, when very soon the *gas* will be generated, and may be caught over water by a pneumatic trough, (1 or 34). This gas may also be obtained, by putting to five parts of water, one of phosphorus, (cut small), with one of very fine granulated zinc, and afterwards adding three parts of strong sulphuric acid. In this amusing experiment, the gas is liberated in small bubbles, which cover the whole surface of the fluid, and take fire on reaching the air, produce a *fountain or well of fire*, (see 30).

370. TO GRANULATE ZINC.—It may not be out of place to explain in this paragraph, *how zinc is granulated* or reduced to the grain; it has merely to be heated to near its melting heat, and then smartly powdered with a hammer, while hot, and you will then have prepared *granulated zinc.*

371. COMPOSITION OF HUMAN BONES.—Berzelius has given the following view, of the results of his analysis of human bones—

	Dry Human Bones.	Enamel of Human Teeth.
Cartilage,	32.17	—
Blood vessels,	1.13	—
Fluate of lime,	2.0	3.2
Phosphate of lime,	51.04	85.3
Carbonate of lime,	11.30	8.0
Phosphate of magnesia,	1.16	1.5
Soda, muriate of soda, water, &c.	1.20	2.0
	100.	100.

100 parts of bones being calcined (burned) are reduced to 63 parts, and 100 parts of such calcined bones are composed of

Phosphate of lime,	82	parts
Fluate of lime,	3	—
Lime, itself,	10	—
Phosphate of magnesia,	1	—
Soda,	2	—
Carbonic acid,	2	—
Calcined bones,	100	parts.

Thus we see, that of the fifty-four simple substances, of which all matter (with which we are acquainted) is composed, viz.—Mountainous rocks, air, earth, and the ocean with its contents; no less than seven of them enter into the composition of our bones. It has been supposed that at a distance from the surface of the earth, towards its centre, there are nothing but masses of pure metal; *if so*, how striking is the analogy between this globe's constitution, as to its basis, and that of man, for in our bones, according to the above analysis, the first atoms of them are metallic. What is phosphate of lime? why, it is phosphoric acid, (see 365), and lime is the metal calcium and oxygen, (235). And what is phosphoric acid? why, that fiery substance phosphorus, (see 364); and *oxygen gas* is the most eminent supporter of combustion: and what is lime? why, it is oxygen *again*, in combination with that silvery-white shining metal CALCIUM, (see 234. Therefore 82 parts out of the 100 of human bones, after being burned, are composed of three simple bodies, viz.—*Phosphorus*, Oxygen, and the *metal* Calcium. 2ndly. We have three parts fluate of lime; and what is FLUATE OF LIME? why, it is Fluoric Acid and Lime; and what is Fluoric Acid? why, it is Fluorine and Oxygen;—*the lime as before*. I once heard a minister of the name of Welsh, at Falkirk, lecturing on Chemistry, Fluoric Acid being a part of his subject; he stated that their was, at that time, 1828. no body in nature that could contain it, (hi ho, thinks I), here is, found out at last, the universal solvent; but my readers, the gentleman spoke rather too fast, in attributing such infinite solvent powers to this compound, no doubt it dissolves glass and all *metallic oxides* rapidly; but metals, in their metallic state, and many other substances, such as charcoal, sulphur, or phosphorus, can contain it; nevertheless, it is the most universal solvent we are acquainted with; and this active substance is one of the ingredients of human bone; just think on that, and keep your *mind's eye* at the same time on the phosphorus, that *fiery* substance, and the oxygen—that eminent supporter of combustion; and say if it is any wonder (*provided he knew*) why an old and ancient author exclaimed—"Truly we are fearfully and wonderfully made!" 3rdly. We have 10 parts in the 100 of lime—and lime, as I stated before, is oxygen and the metal CALCIUM, (see 234, 235). 4thly. We have one part of the phosphate of magnesia. This is *phosphorus* and *oxygen* in combination with magnesia: and what is magnesia?

why, it is a metal called magnesium, which is of a silver-white appearance, and has a strong metallic splendour, which is hard and malleable, and melts at the same degree of heat, as silver. In the state of magnesia, it is oxidated or rusted by oxygen. 5thly. There are two parts of soda; and I again ask, what is soda? why, it is the metal sodium, (see 102) which when thrown into water burns with a yellow flame, and thus combines with oxygen forming *soda.* 6thly. We have two parts of carbonic acid—again, what is carbonic acid? why, charcoal dissolved in oxygen, (see 60).

Thus we have in the constitution of human bones as simple substances—

1st. PHOSPHORUS, that fiery substance, combined with 83 proportions in the 100.

2nd. OXYGEN, that eminent food for fire, in every proportion and combination.

3rd. CALCIUM, that silver-looking metal, in 95 parts.

4th. FLUORINE, that extraordinary solvent and corrosive body, in three parts.

5th. MAGNESIUM, the metal magnesium in *one.*

6th. SODIUM, the metal sodium, that takes fire and burns in water with a yellow flame, in *two*; and

7th. CARBON or CHARCOAL in other two.

Therefore, in our bones, and forming their basis, are three metals, Calcium, Magnesium, and Sodium; with Charcoal, Phosphorus, Oxygen, and Fluorine. Bones are of great use in the arts and manufactures; they are used by the potter to give transparency to his porcelain;—in shoe-blacking,—in ivory black,—in bread powdered,—in fact, many a human being could not be put to half the useful purposes while alive, that his bones could be made to fulfil after his death.

372. THE ÆOLIPILE.—The æolipile is a small hollow globe of brass, or other metal, in which a slender neck or pipe is inserted. This ball, when made red-hot, is cast into a vessel of water, which will rush into its cavity, then almost void of air. The ball being set on the fire, the water, by the rarefaction of the internal air, will be forced out in steam by fits, with great violence, and with strange noise. If to the necks of two or more of these balls, there be fitted those calls that are used by fowlers and hunters, and the balls placed on the fire, the steam rushing from them will make such a horrible noise, that it will astonish any person who is ignorant of the contrivance.

373. THE TALKING BUSTS, OR A LITTLE OF VENTRILOQUISM.—Procure two busts of plaster of Paris, place them on pedestals, on the opposite sides of the room. Let a thin tube, of and inch diameter, pass from the ear of one head through the pedestal, under the floor, and go up to the mouth of the other; taking care that the end of the tube that is next the ear of the one head, be considerably larger than that end which comes to the mouth of the other. Now

when a person speaks quite low into the ear of one bust, the sound is reverberated through the length of the tube, and will be distinctly heard by any one placing his ear to the mouth of the other. It is not necessary that the tube should come to the mouth of the bust. If there be two tubes, one going to the ear, and the other to the mouth of each head, two persons may converse together by whispers, without the knowledge of any person who may stand in the middle of the room.

374. THE INANIMATE ORACLE.—Place a bust on a pedestal in the corner of a room, let there be two tubes, as in the preceding article, one to go from the mouth, and the other from the ear, through the pedestal and the floor to an under apartment; there may be also wires, that go from the under jaw and eyes of the bust by which they may be easily moved. A person being placed in the room underneath, and applying his ear to one of the tubes at a signal given, will hear any question asked, and can immediately reply, by applying his mouth to the tube which communicates below, at the same time moving the eyes by the wire to accompany his speech.

375. THE SOLAR CONCERTO.—In a large case, similar to what is used for dials and spring clocks, the front of which, or at least the lower part, must be of glass, covered on the inside with gauze, place a barrel organ, which when wound up is prevented from playing by a catch that takes a toothed wheel at the end of the barrel. To one end of this catch join a wire, at the end of which is a flat circle of cork, of the same dimensions with the inside of a glass tube, in which it is to rise and fall. This tube must communicate with a reservoir that goes across the front part of the bottom of the case, which is to be filled with spirits, such as are used in thermometers. This case being placed in the sun, the spirits will be rarified by the heat, and rising in the tube, will lift up the catch or trigger, and set the organ in play; which will continue as long as it ir kept in the sun; for the spirits cannot run out of the tube, that part of the catch to which the circle is fixed being prevented from rising beyond a certain point, by a check placed over it. Care must be taken to remove the machine out of the sun before the organ runs down, that its stopping may be evidently effected by the cold. In winter it will perform when placed before the fire.

376. CORRESPONDENT—"*A Pupil*,"—Enquires if no substitute for putty could be had, that would adhere better to the face in taking stucco moulds therefrom, as he has felt much difficulty in getting it to adhere to the face, till the mixture had fixed. The Editor respectfully informs him that he has found soft soap answer exceedingly well, and besides after the removal of the cast, it assists to clean the face by washing with water, which should always be done immediately after removing the mould.

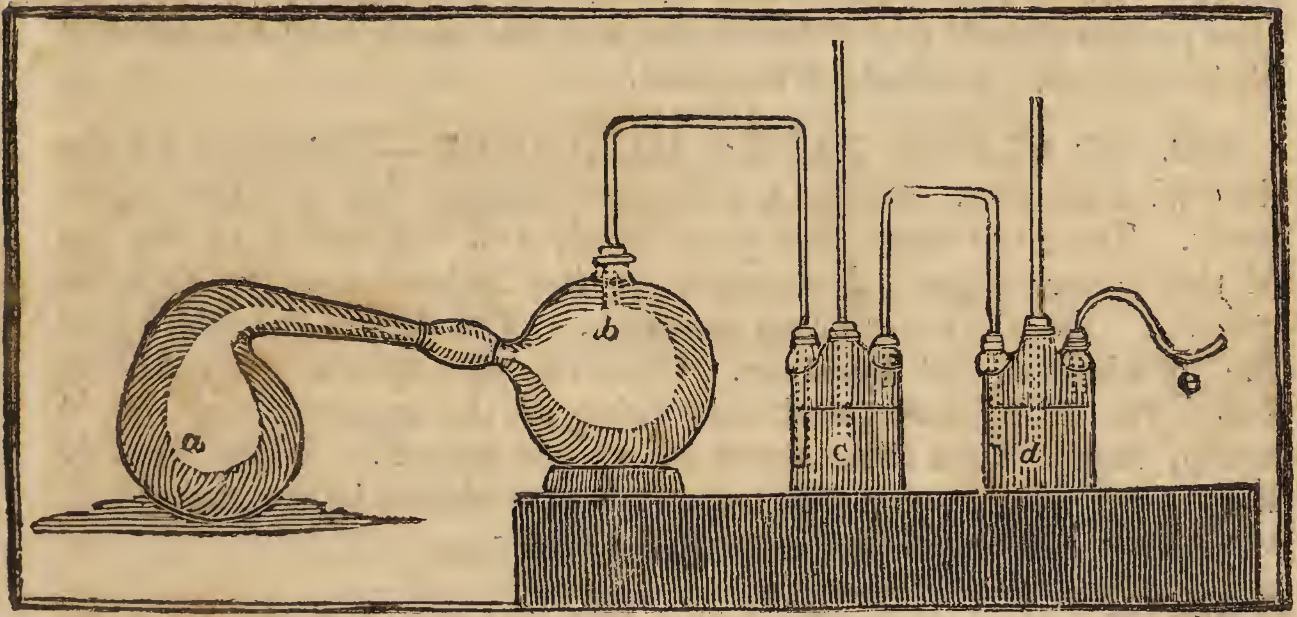
377. Purchasers of "*Stuart's Useful Information*" are dutifully informed, that the first edition of the Reformer's Almanack, now published, is uniform *with*, and may be bound up with the rest of his works.

Stuart's Useful Information for the People, No. 20,

Being No. 11, of the

CHEMICAL EXPERIMENTALIST.

378. WOULFE'S APPARATUS.



379. Cheap and Easy Method of Brewing.—One bushel of malt and three-quarters of a pound of hops will, on an average, brew twenty gallons of good beer. For this quantity of malt boil twenty-four gallons of water; and having dashed it in the copper with cold water to stop the boiling, steep the malt (properly covered up) for three hours; then tie up the hops in a hair-cloth, and boil malt, hops, and wort altogether for three quarters of an hour, which will reduce it to about twenty gallons. Strain it off, and set it to work when lukewarm. In large brewings this process perhaps would not answer; but in small ones, where the waste is not so great, and where the malt can be boiled, the essence is sure to be extracted.

380. To Marble Books or Paper.—Marbling of books or paper is performed thus:—Dissolve four ounces of gum arabic in two quarts of fair water; then provide several colours mixed with water in pots or shells, and with pencils peculiar to each colour; sprinkle them by way of intermixture upon the gum water, which must be put into a trough or some broad vessel; then with a stick, curl them or draw them out in streaks to as much variety as may be done. Having done this, hold your book or books close together, and only dip the edges on the top of the water and colours very lightly; which done, take them off, and the plain impression of the colours in mixture will be upon the leaves; doing the ends as well as the front of the book in like manner.

381. TO CLEAN PAINT.—Never use a cloth, but take off the dust with a little long haired brush, after blowing off the loose parts with the bellows. The paint will look well for a length of time. When soiled, dip a sponge or a piece of flannel into soda and water, wash it off quickly, and dry immediately, or the strength of the soda will eat off the colour. When wainscoat requires scouring, it should be done from the top downwards, and the soda be prevented from running on the unclean part as much as possible, or marks will be made which will appear after the whole is finished. One person should dry with old linen as fast as another has scoured off the dirt and washed off the soda.

382. TO CLEAN PAPER HANGINGS.—First blow off the dust with bellows. Divide a white loaf of eight days old into eight parts. Take the crust into your hand, and beginning at the top of the paper, wipe it downwards in the lightest manner with the crumb. Do not cross or go upwards. The dirt of the paper and the crumbs will fall together. Observe, you must not wipe above half a yard at a stroke, and after doing all the upper part go round again, beginning a little above where you left off. If you dont do it extremely light, you will make the dirt adhere to the paper.

Note. It will look like new if properly done.

383. To give a fine Colour to Mahogany.—Let the tables be washed perfectly clean with vinegar, having first taken out any ink stain there may be, with spirit of salt; but it must be used with the greatest care, and only touch the part affected, and instantly wash it off. Use the following liquid:—Into a pint of cold-drawn linseed oil, put four pennyworth of alkanet root, and two pennyworth of rose-pink, in an earthen vessel, let it remain all night, then stirring well, rub some of it all over the tables with a linen rag; when it has lain some time, rub it bright with linen cloths.

384. To take Ink out of Mahogany.—Dilute half a tea-spoonful of oil of vitriol with a large spoonful of water, and touch the part with a feather, watch it, for if it stays too long it will leave a white mark. It is therefore better to rub it quick, and repeat it if not quite removed.

385. To preserve Iron from Rust.—Melt fresh mutton suet, smear the Iron over with it while hot: then dust it well with unslacked lime pounded, and tied up in muslin. Irons so prepared will keep many months. Use no oil for them at any time, except salad oil; there being water in all other.

Note. Fire Irons should be kept wrapt in baize, in a dry place, when not used.

386. To take Rust out of Steel.—Cover the steel with sweet oil well rubbed on it, and in forty-eight hours use unslacked lime finely powdered, and rub until all the dust disappears.

387. A STRONG PASTE FOR PAPER.—To two large spoonfuls of fine flour, put as much strong beer as will make it of a due consistence, and boil half an hour. Let it be cold before it is used.

388. FINE BLACKING FOR SHOES.—Take four ounces of ivory black, three ounces of the coarsest sugar, a table-spoonful of sweet oil, and a pint of small beer: mix them gradually cold.

389. ANOTHER.—Take four ounces of ivory black, half a pint of treacle, an ounce of gum arabic, half a gill of sweet oil, and a table-spoonful of oil of vitriol; grind all these well together with a muller on a smooth flag. After being as well ground as paint, put it into a pot or saucepan, to which add a quart of stale beer or porter, and boil all well together, on a slow fire, for half an hour, keeping it well stirred; then bottle it, and in twenty-four hours after, it will be fit for use.

Note. This blacking gives the most beautiful gloss of any yet found out, and with the least trouble in using.

390. AN EFFECTUAL LIQUID FOR RESTORING STAINED OR FADED BOOT TOPS TO THEIR ORIGINAL NEW COLOUR.—To one ounce of spirit of salt add one ounce of spirit of wine, one ounce of oil of vitriol, the juice of two lemons, and one quart of sweet milk, bottle it and shake it well together before using. As much of its effect depends on the method of using, it may not be improper, here to give some directions. Wash your boot tops with warm water and soap till the dust is clean off, then dry them very well, let the boot be put on a boot-tree, get a Bath brick of a fair colour, and powder it very fine, put about a tea-spoonful into a saucer, then add a table-spoonful of the above liquid, so as to make it into a thin paste, then with a brush, apply it to the tops, keep rubbing pretty constant till all the stains disappear, after which, wash all off with fair water, and a clean sponge, and when dry, polish them with a piece of clean flannel, and they will look like new.

391. EXTRACTS FROM DR. URE'S LECTURE, 12th Feb. 1826.—Sulphur casts are made with vermillion and sulphur mixed in equal proportions, (see 318). Phosphorus may be adulterated with *sulphur.* Plumbago or black-lead is merely charcoal in combination with a minute portion of iron. 100 lbs. of burned bones produce 40 lbs. of phosphoric acid, and this forms from six to eight pounds of phosphorus. Take a Florence flask, and about half fill it with water, and drop a piece of phosphorus into it; then with a bladder filled with oxygen gas, and provided with a stop-cock and a long glass tube attached, introduce the long glass tube of the bladder to the bottom of the flask, and bring it in contact with the phosphorus at the bottom of the water; now, turn the stop-cock and press the bladder, and the phosphorus will burn beneath the water and form a hydrogenetted phosphorized water, having an acid and sour taste. In burning phosphorus to form phosphorus acid in atmospheric air,

let it be done in a very tall bell glass, and let the iron for burning the phosphorus be supported on the bottom of a wine-glass, with bits of card put below the edges of the glass to admit air—the phosphorus acid, formed on the bottom, soon disappears and becomes liquid.

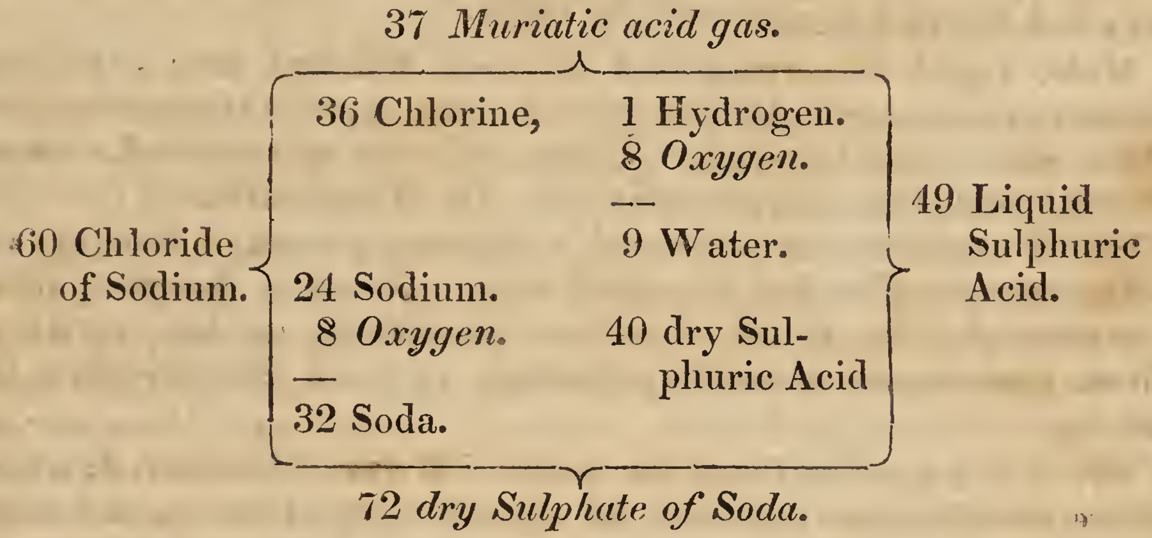
392. DESCRIPTION OF WOULFE'S APPARATUS, FIGURE NO. 378.—The first figure on the left is *a*, the *retort*, one end of this retort terminates in the first receiver or balloon, *b*; this receiver has a bent tube fixed into its upper *tubular*, while the other extremity of the bent tube is made to terminate below the surface of distilled water, in the vessel *c*; from the opposite neck of this three-necked bottle, *c*, proceeds another hollow tube bent at right angles, with its extremity also inserted beneath the surface of distilled water in *d*; of these bottles any number may be employed that is thought necessary; and to the central neck of each of these bottles, a straight tube of safety open at both ends, is also fixed, so as that the lower end may also be a little below the surface of the water.

393. DISTILLATION AND CONDENSATION BY WOULFE'S APPARATUS.—The materials being introduced into the retort, *a*, the distillation is begun; the condensable vapour collects in the balloon, *b*, while the evolved gas passes off from the balloon, through the right angular bent tube, and is liberated beneath the surface of the water in *c*, which water will continue to absorb the gas till saturated; when the water of the first bottle, *c*, can absorb no more, the uncondensed gas passes through the second right-angled tube, into the water of the second receiver, *d*, which in its turn also becomes saturated—and any gas that may be produced, and which is not absorbable by water may be caught from the tube, *e*, by inserting its extremity beneath an inverted receiver on the shelf of a pneumatic trough, (see 34).

394. MURIATIC OR HYDROCHLORIC ACID GAS.—When one volume of hydrogen gas (4) has been made to combine, either silently or explosively, with one volume of chlorine gas (105) the product is two volumes of a new gas differing essentially from either of its components, and especially in being instantly absorbed with water, the name of this new compounded gas is HYDROCHLORIC ACID GAS—a drop or two of water admitted to a large jar of this gas, causes the whole of it to disappear,—and Muriatic Acid—Spirit of Salt—Liquid Hydrochloric Acid is formed.

395. TO PREPARE LIQUID HYDROCHLORIC OR MURIATIC ACID.—Into the retort, *a*, (fig. 378), placed in a sand bath, put eight parts of dried chloride of sodium. (*common salt*), and upon this pour seven parts, by weight, of strong sulphuric acid, (oil of vitriol), and the muriatic acid gas will be liberated in great quantities, and will be condensed in the bottles *c* and *d*, in which must be previously put five or six parts of water, when the water in the receivers *c* and *d* are saturated with the gas, the contents of both will be *Muriatic Acid—Spirit of Salt.*

396. THEORY OF THE FORMATION OF MURIATIC ACID.—The theory of this process has been explained by Mr. Phillips, with the aid of the following diagram. Chloride of sodium is a compound of 36 chlorine and 24 of the metallic body sodium; liquid sulphuric acid consists of 40 parts of dry acid and 9 of water, the water being composed of 1 hydrogen and 8 oxygen. When these substances act upon each other, the water and chloride of sodium are both decomposed; the 1 of hydrogen uniting with 36 of chlorine, constitute together 37 of muriatic acid gas; and the 8 of oxygen with the 24 of sodium form 32 of soda, which, uniting with the 40 parts of dry sulphuric acid, compose 72 of dry sulphate of soda. The 37 of muriatic acid gas, combining with the water in the receivers.



397. THEORY OF THE DECOMPOSITION OF MURIATIC ACID TO PROCURE CHLORINE.—When liquid muriatic acid is brought into contact with any substance containing oxygen in a state of loose combination, such as red lead or the *oxide of manganese;* the hydrogen of the acid unites with the oxygen of the lead or manganese, and forms water, while the chlorine is liberated in a gaseous state. It is in this way that chlorine is procured for the purposes of chemistry and the arts; but instead of liquid muriatic acid it is usual to substitute materials capable of furnishing the acid gas, viz. common salt, sulphuric acid, and oxide of manganese.

398. TEST FOR MURIATIC ACID.—Add a drop or two of muriatic acid to a tumbler of water, into this let fall a drop of the solution of nitrate of silver, (*common caustic*), and the whole will instantly assume a white milky appearance; from the composition of the muriate by the decomposition of the nitrate of silver. So great is the power of this test, that though the muriatic acid may not amount to more than 1,000,000 part of the whole weight of the solution, it will be detected by the nitrate of silver in form of a white cloud.

399. TO MAKE MOIREE METAL, OR CHRYSTALLIZED TIN.—With soap and water clean a piece of tin from all grease, then heat the sheet of tin—commonly known by the name of white-iron—at a fire till it is so hot that the hand cannot be suffered to remain on it; then, having previously mixed half an ounce of muriatic acid with

one-fourth of an ounce of sulphuric acid, (oil of vitriol), and two ounces of water, wash the tin over with this, and afterwards in water slightly acidulated, and after that again in clear water, and the tin will then assume a beautiful crystallized mother-of-pearl appearance, having all the forms of crystallized ice; let it afterwards be varnished with transparent varnish, and it is complete.

400. To shew that Light Muriate of Silver may be changed from White to Black.—Put a little of the nitrate of silver into a wine or test glass, to which add a few drops of muriatic acid, and a white precipitate will fall down, which is part of the silver combined with the muriatic acid. Pour off the clear liquid from this precipitate, then expose it to the rays of the sun for an hour or two, and it will become perfectly black.

Note. Light is a compound of seven different rays or colours, which is shewn by making it pass through a solid triangular piece of fine glass, called a prism. These different rays are red, orange, yellow, green, blue, purple and violet. Dr. Herschell found that each of these rays not only possessed a different power of heating and illuminating bodies, but also of effecting a chemical change on them. For example, the violet ray effects the change on the muriate of silver, (mentioned in last experiment), in much less time than the red ray.

401. To produce Cold by mixing Nitric Acid and Snow.—Dilute a little nitric acid with an equal weight of water, and when the mixture has cooled, add to it a quantity of light new-fallen snow. On immersing the thermometer in the mixture, a very considerable reduction of temperature will be indicated.

402. To Freeze Water in Summer.—Mix together 10 drams of muriate of ammonia, 10 of nitrate of potash, and 15 of sulphate of soda, all finely powdered. Put this mixture into 30 drams of water contained in a small cup, and then immerse a thin glass tube in it containing a little water, and in a few minutes it will be frozen. This mixture produces 46° of cold, (see 255).

Note. There are many other freezing mixtures, such as sulphate of soda and nitric or muriatic acid, snow and muriatic acid, &c.; but the most powerful is a mixture of muriate of lime and snow. To produce the greatest effect by this mixture, equal weights of the salt finely powdered and new fallen snow must be quickly mixed together.—This is the mixture which is employed to freeze quicksilver.

403. To form Nitro-Muriatic Acid—Aqua Regia.—Mix two parts of concentrated nitric acid with one part of muriatic acid; this compound is termed nitro-muriatic acid, and sometimes aqua-regia, because it dissolves gold, which was formerly called the king of metals.

404. A new and easy Method of obtaining Fulminating Gold.—Take a small quantity of the solution of gold in aqua-regia, (402),

and pour it into a large glass of red wine, (Bourdeaux), and a sediment will be formed, which, when dried, and placed on burning charcoal in an iron capsule, will explode.

405. To prepare Fulminating Silver.—Dissolve pure silver in nitric acid, and precipitate the silver by lime-water; put the precipitate upon filtering paper, and when dry put it into a shallow vessel; then pour liquid ammonia upon it, and when it has stood about twelve hours, pour off the liquid, and a black powder will remain, which must be carefully set in a proper place to dry.—This powder is fulminating silver.

Note. When this powder is once prepared, no attempt must be made to enclose it in a bottle, or even to remove it from the vessel in which it is prepared, as the slighest degree of friction causes it to explode. It even explodes when moist, on the gentlest friction being applied to it.

406. To exhibit the explosive Force of Fulminating Silver. Take about half a grain, by weight, of fulminating silver, and place it on an anvil, or smooth stone, then strike it with a hammer, and a loud and stunning report will immediately be produced.

Note. Half a grain is as much as can be operated upon with safety. If it is prepared as directed in the foregoing experiment, not more than a grain should be prepared at once.—There is a kind to be obtained in the shops in London, called Brugnetelli's Fulminating Silver, which does not explode quite so easily as that prepared by the above process. With it the following experiments may be made.

407. To prepare Fulminating Bombs.—Procure a few glass balls of about a sixth part of an inch in diameter, and put the third part of a grain of fulminating silver upon a piece of soft paper, then paste the paper round one of the glass balls, and on treading upon it, or throwing it with force against a stone, it will break and give a report like a musket.

408. To make an Artificial Spider containing Fulminating Silver.—Take about one-third of a grain of fulminating silver, and enclose it in a piece of paper or cloth made up in the form of a spider, then place it in a situation where it is likely to be trode on; and when this happens, the noise will perhaps afford some amusement.

409. To enclose Fulminating Silver in a Candle.—Take about the third part of a grain of fulminating silver, and put it into the wick of a candle which is to be burned by a person you wish to surprise. When the flame reaches the powder, it will immediately explode with a stunning report.

Note. Tricks of a similar kind may be played, by rolling up the third part of a grain into a piece of paper, and putting it into a pair of snuffers, under the foot of a chair, into a person's boots, or shoes, or on the end of a walking-stick.

410. Iron, 630 times more valuable than Gold.—Iron is often manufactured so as to be 150 times more valuable than gold; nay,

for some fine purposes it is above 630 times more valuable. For instance, common watch pendulum spring are sold in London for half a crown a-piece, and ten of them are equal in weight to but one single grain, now one pound, avoirdupois is equal to 7000 grains, and therefore contains ten times as many of these springs, which at half a crown a-piece amount to £8750 sterling. The Troy ounce of gold sells at £4, and the pounds contain 5760, at £48 sterling. But the pound avoirdupois contains 7000 grains Troy, which gives £58 6 7 for each pound of gold, which makes it more than 150 times in value. But the best pendulum springs sell at half a guinea a-piece, and therefore the above value must be increased in the ratio of 1. to 4.2, viz. of half a crown to half a guinea, which will amount to £36750 sterling, and this sum divided by the value of a pound of gold, gives a little more than 630 times for the quotient.

411. THE YANKEE OR AMERICAN WAY TO FATTEN A MAST OR SPAR.—It has long been a matter of interesting curiosity to our sea-faring men, why the masts and spars of American vessels retained their elasticity and spring, during repeated voyages to India and between the Tropics; while our masts get as brittle as *pipe-shanks*, and as *frush* as *spunk-wood*. The whole secret is as follows;— at the top of the mast there is a hole made of such a size as may hold from a pint to one gallon; it is the carpenter's duty to fill this hole with turpentine, and drive a plug tight in afterwards; this turpentine passes down amidst the longitudinal fibres of the mast, and accord- to the Yankee-seaman's phraseology, it is said to fatten the mast. An American ship-carpenter pays as much attention to, and as regularly feeds his vessels' masts, in order to fatten or keep them fat, as a carrier or horseman (in this country) does by corning his horse.

412. CORRESPONDENT T. M. GORBALS—is respectfully informed, in answer to his very respectful and flattering letter, that GALVANISM will be treated on, in No. 13, being the first number of the 3rd part of this work, when a cheap and easy way of making a Galvanic Battery will be described. The Editor would have complied with the request sooner, but as drawings are required to illustrate the subject, the delay cannot be avoided.

412. NOTICE TO THE SUBSCRIBERS AND READERS OF THE CHEMICAL EXPERIMENTALIST.—A Friend of the Editor, who is in possession of a great number of unpublished manuscript lectures, in the hand-writing of the late John Anderson, Professor of Natural Philosophy in the University of Glasgow, and Founder of the Glasgow Andersonian Mechanics' Institution, has kindly favoured the Editor with the benefit of these interesting documents, among which are many valuable papers which shall from time to time enrich the columns of this work; some of these papers thoroughly out-perkin Perkins with his steam gun, *in the art of war;* in an early number one of these papers will appear, shewing the eccentric revolutions of that IMMENSE COMET which caused NOAH'S FLOOD, and the time, (so near at hand), by the calculation of *Our Great Anderson*, when we may soonest expect a repetition of that awful catastrophe ! !

Stuart's Useful Information for the People, No. 21,

Being No. 12, of the

CHEMICAL EXPERIMENTALIST.

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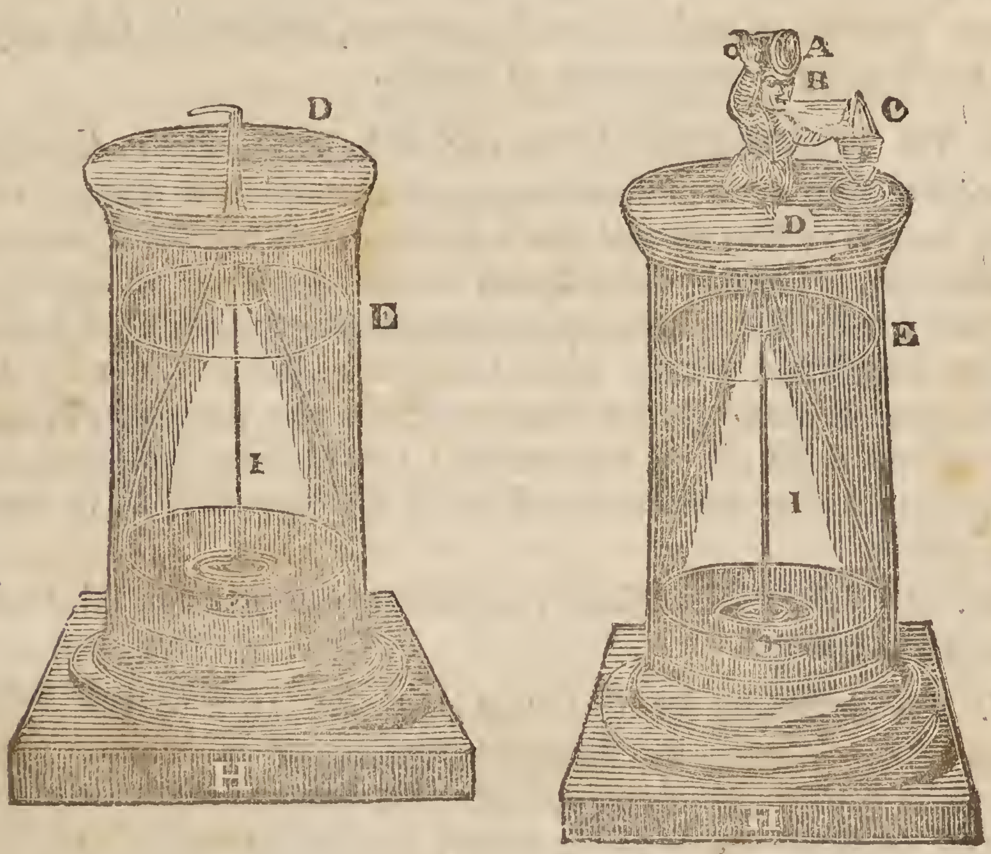
413. THE HYDRO-PNEUMATIC LAMP.



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414. OF THE OXIDE OF SULPHUR AND SULPHURS.

– If sulphur be kept melted in an open vessel, it becomes gradually thick and viscid. When in this state, if it be poured into a basin of water, it will be found to be of a red colour, and as soft as wax. In this state it is employed to take off impressions from seals and medals. These casts are known in this country by the name of *sulphurs,* (see 318, 361). When exposed to the air for a few days, the sulphur soon recovers its original brittleness, but it retains its red colour. It is supposed at present, that sulphur, rendered viscid and red by a long fusion, has combined with a little oxygen; hence the term *oxide of sulphur* has been applied to it. This substance, when newly made, has a violet colour; it has a fibrous texture; its specific gravity is 2.3; it is tough, and has a straw colour when pounded. 100 parts of it, when converted into sulphuric acid by means of nitric acid, become 160 parts, and therefore it has united with 60 parts of oxygen.

415. TO PREPARE STARCH FROM POTATOES.—Grind a quantity of Potatoes into a pulp by rubbing them on a plate of tin in which a number of holes have been made, then put them into a hair sieve, and pour cold water over them as long as a milky liquid passes through. This liquid is to be received into a basin, and when a whitish powder has settled at the bottom, the liquid is to be poured off it, and the powder repeatedly washed with spring water, until it become perfectly white. When the last liquor has been poured off, the basin is to be placed in a warm place till the starch be perfectly dry.

Note. Twenty pounds of good potatoes, treated in this way, generally yield about four pounds of starch.

416. TO ETCH DESIGNS ON GLASS.—Cover the glass all over with a thin coat of bees' wax, and trace the design with an etching needle; then spread the whole over as uniformly as possible with fluor spar (Derbyshire spar) to the depth of an eighth of an inch, and when this is done, pour sulphuric acid, diluted with three times its weight of water, upon the spar. After the acid has remained upon it three or four hours it is to be poured off, and the glass washed with oil of turpentine; the etching will then appear, and the parts that were covered with the wax will have remained untouched.

Note. By this means glass vessels may be graduated and ornamented very easily.

417. To prepare an Oil for Clocks, and other Delicate Machinery.—The oil for diminishing friction in delicate machines ought to be completely deprived of every kind of acid and mucilage, and to be capable of enduring a very intense degree of cold without freezing. In fact, it ought to consist entirely of *elaine* or the *oily* principle of solid fat, and to be perfectly free from *stearine* or *solid fat.* Now it is not a difficult matter to extract the *elaine* from all the fixed oils, and even from seeds, by the process recommended by Chevreul, which consists in treating the oil in a mattras with seven or eight times its weight of alchol till boiling. The liquid is then to be decanted, and exposed to the cold, the *stearine* will then separate from it in the form of a crystallized precipitate. The alcholic solution is afterwards to be evaporated to a fifth part of its volume, and the *elaine* will then be obtained, which ought to be colourless, insipid, without smell, and incapable of altering the colour of the infusion of litmus or turnsole, and having the consistence of pure white olive oil.

418. Combustion of Iron by a Jet of Sulphur in vapour.—If a gun-barrel be heated red-hot at the butt-end, and a piece of sulphur be thrown into it; on closing the mouth with a cork, or blowing into it, a jet of ignited sulphurous vapour will proceed from the touch-hole. Exposed to this, a bunch of iron wire will burn, as if ignited in oxygen gas, and will fall down in the form of fused glob-

ules, in the state of protosulphuret—hydrate of potash exposed to the jet, fuses into a sulphuret of a fine red colour.

419. Easy mode of imitating Chalybeate Waters, by Galvanism.—Dr. Hare, of Philadelphia, has remarked, that if a few pieces of silver coin be alternated with pieces of sheet iron, on placing the pile in water, it soon acquires a yellowish hue and chalybeate taste, and in twenty-four hours flocks of oxide of iron appear. Hence, by replenishing with water, a vessel in which such a pile is placed, after each draught, we may have a sufficient substitute for a chalybeate spring. Clean copper plates alternating with iron, would answer, or a clean copper wire entwined on an iron rod; but as the copper yields an oxide, it is safer to employ silver.

420. TO PRESERVE EGGS FOR TWO YEARS FRESH.—In 1820, a tradesman of Paris asked permission of the prefect of police to sell, in the market, eggs that had been preserved a year in a composition, of which he kept the secret. More than 30,000 of these eggs were sold in the open market without any complaint being made, or any notice taken of them, when the Board of Health thought proper to examine them. They were found to be perfectly fresh, and could only be distinguished from others by a pulverous stratum of carbonate of lime, remarked by M. Cadet to be on the egg-shell. This induced him to make a series of experiments, which ended in his discovering that they were preserved in highly saturated lime-water. M. Cadet suggests adding a little saturated muriate of lime, but gives no reason. They may also be preserved by immersing them twenty seconds in boiling water, and then keeping them well-dried in fine sifted ashes; but this will give them a greyish green colour. The method of preserving them in lime-water has been long the practice of Italy; they may be kept thus for two years. This useful mode is well known in many parts of England, and cannot be too much recommended.

421. Inflammation of Sulphuretted Hydrogen by Nitric Acid.—When a few drops of nitric acid are put into a flask, filled with sulphuretted hydrogen, the hydrogen is divided by the nitric acid, and the sulphur is disengaged in a solid form. If the flask be closed with the finger, so that the gas, which becomes heated, cannot escape, its temperature is raised so much as to produce combustion, with a beautiful flame, and a slight detonation, which forces the finger from the mouth of the flask. This experiment may be made without the least danger, with a flask containing four or five cubic inches of gas.

422. Preservation of Fruits by Carbonic Acid.—The details of some very interesting experiments will be found in the *Ann. de Chim. et de Phys.* (Jan. 1819), tending to prove that Fruits may be preserved by means of carbonic acid gas, (see 60, 61). Cherries, grapes, pears, apples, and chesnuts, were placed in glass vessels filled with this gas, obtained from carbonate of lime by sulphuric

acid. Neither the colour nor the taste of the cherries were altered at the end of fifteen days; and at the end of six weeks they were in the same state as if they had been preserved in brandy.

423. RECEIPT FOR DYEING TURKEY-RED, EXTRACTED FROM ETON'S TURKISH EMPIRE.—Cotton, at Smyrna, is dyed with madder in the following manner:—The cotton is boiled in common olive oil, and then in mild alkali; being cleaned it will then take the madder dye: and this is the fine colour we see in Smyrna cotton yarn.

424. GRIM VISAGES AND GHASTLY FEATURES.—To one part of phosphorus, add six parts of olive oil, and let them digest over a sand-heat, until the phosphorus is dissolved. This preparation may be rubbed on the face and hands without danger, and the appearance thereby produced is most hideously frightful, it does no harm, but casts a smoky light in the dark. Having shut your eyes, and rubbed a little over your face, look into a mirror or dressing-glass; all the parts of your face will appear covered with a luminous bluish flame, whilst the eyes, nostrils, and mouth, present the appearance of dark spots.

425. ARBOR MARTIS OR IRON TREE.—Dissolve steel filings, in strong aqua-fortis, till the acid is tolerably well saturated therewith. Add thereto, gradually, a solution of fixed alkali. An effervescence accompanies each admixture; the iron, instead of falling to the bottom of your vessel, will ascend, covering the sides thereof, and forming a great number of curious ramifications, heaped one upon another, until they pass over the edge of the vessel, in the form of an over luxuriant plant.

426. THE HYDRO-PNEUMATIC LAMP.—An elegant light has been recently manufactured, on a principle discovered within these few years, namely, the inflammation of hydrogen gas by means of spongy platinum. The action of the principle is this, if a stream of hydrogen gas be made to play on a piece of platinum, in a state of minute division, the platinum will become red-hot, and the hydrogen will be immediately inflamed. In order to perform this experiment, it is necessary to *make* hydrogen gas, and then to pass it through a small jet against the platina, (as seen in figure 413). Into a glass or lead cylindrical receiver, E, is put a mixture of sulphuric acid and water, (see 4); and again, into this cylindrical receiver is put a funnel-shaped vessel, (also of glass or lead), with its wide end downwards, and its small end upwards, with a jet and stop-cock fixed at its upper end; let a piece of zinc be now suspended by a wire, as seen at C and I, from the interior of the apex of the inner funnel-shaped vessel, D, I, it will readily be understood from the description of the contrivance, that this inner vessel is just like a florence flask with its bottom cut away, and its neck lengthened out into a jet: therefore, the diluted sulphuric acid, acting upon the zinc at the bottom, will cause hydrogen gas to be generated; this gas will rise above the liquid in the funnel-shaped vessel, and

as it increases it will force the liquid downwards, and out by its bottom into the external cylinder; therefore, on turning the stop-cock at the neck of the bottomless florence flask-shaped vessel, the pressure of the liquid raised to E, in the cylinder, will, on turning the stop-cock, force out the gas by the jet upon the platinum, c, which as said before will become red-hot, and the hydrogen will be inflamed. This is a philosophical, pretty, cheap, and simple apparatus for obtaining a light expeditiously in a bed-chamber.

427. To make Cases for Squibs or Serpents.—Make cases of about six inches in length, by rolling slips of cartridge paper three times round a roller, and pasting the last fold down, tie it near the bottom, as tight as possible, and make it air-tight at the end by sealing-wax, then set them in a situation to dry.

428. Preparation to fill Squibs and Serpents.—Take eight ounces of gunpowder, (or the cheap substitutes, 205, 332, or the meal powder, 334), one ounce of charcoal, one ounce of brimstone, half an ounce of steel filings, and grind all well together, (as directed 334) a common mortar and pestle might also be used; but great caution is required in rubbing, lest it might inflame, and burn the operator.

429. To fill Squibs or Serpents.—Your cases being dry and ready, first put in a thimbleful of gunpowder, and ram it hard down with a wooden rammer; then fill the case to the top with the preparation, (428), ram it hard down (in the course of filling) two or three times, and when this is done, point it with *touch paper*, (363) —which should be pasted on that part which touches the mixture in the case, otherwise it is liable to drop off.

430. To preserve Eggs sound, for the space of two years.—For the following process, for keeping and preserving eggs perfectly sound, a patent was granted in February, 1791, to Mr. Jayne, of Sheffield, Yorkshire:—Put into a tub or vessel, one bushel (Winchester measure) of quick lime, thirty-two ounces of salt, eight ounces of cream of tartar, and mix the same together with as much water as will reduce the composition or mixture to that consistence, that it will cause an egg put into it to swim with its top just above the liquid; then put, and keep the eggs therein, which will preserve them perfectly sound for the space of two years at the least.

Note. This method is not the worse for being simple, and the still simpler one of keeping eggs in salt, is known by many good housewives, to preserve eggs quite sound a considerable time.

431. To preserve Cream sweet during long voyages at sea.—Mix with a quantity of fresh rich cream half its weight of white sugar in powder; stir the whole well together, and preserve it in bottles well corked. In this state it is ready to mix with tea or coffee, and has continued in good condition during a voyage to America.

432. To make Glass of Lead as Red as Blood.—Put into a pot six pounds of glass of lead, ten pounds of crystal frit, and when purified, cast them into water; then return them into the pot, and when they are well refined, put in five or six ounces of copper, calcined to a red powder, and let them boil up and refine: after that put in a little red tartar in powder, and let the metal boil up again, and well incorporate, and if the colour be not come up to a proper height, put it again in to anneal, until it comes to its colour.

433. A perfect new method, approved of, and very simple, for Raising of Ducks, whereby, with ten or twelve Ducks, may be produced many hundreds in one year.—This is not strictly speaking either a chemical experiment or a receipt, nevertheless having fallen in with it in reading an old French work, I have thought it worthy of a place in my *useful information.* When you have six or eight eggs, let them be covered by a hen for eight or ten days only, after which you bury them in horse-dung, and take care to turn them upside down every twelve hours, until they are hatched, which takes place ordinarily in about one month; if it be required, they may be made to hatch sooner: we have always to put new eggs under the hen, and this process may be continued successively during two or three months, following the same method with the dung. In rainy or cold weather, after having taken the eggs from under the hen, in place of putting them into the dung, place them at a certain distance before the fire, and turn them every twelve hours as before; by these means, ten or twelve ducks or hens will produce each year many hundreds. Perhaps this method might be tried, with success, in hatching fowls and canaries.

434. To make light for Lamps that will not Smoke.—Distil a quart of good olive oil, and make the wick of stalk, or stone alum, like other wicks: which is to be done by steeping them well in water, and they will spin out; and to make the oil rise, make a great many little holes with a fine awl or needle in the wick, and it will give a bright and steady light without smoking.

435. To make a Candle not to be put out by any Wind.—Fill a small pliable or wheat straw with natural live sulphur, wrap it about with fine lint or cotton, cover it about with wax, and make it in the form of a candle; and then if the wind happens to blow it out, the snuff touching the sulphur will immediately light it again.

436, To prevent any Oil that is to burn, from Smoking.—Distil the juice of onions, and put a little of it at the bottom of the lamp, or whatever you burn it in; and the oil swimming on the top, the strength of the distilled liquor underneath, penetrating it, will preserve it from smoking, and make it burn the brighter,

437. A Powder to make all Metals soft.—Take a quarter of a pound of antimony, axinaginum, vitel, and salt, each a like quantity, make these into a powder; melt this powder with the metal, and it will effect your desire.

438. To make Metal melt with Speed.—Put your metal into a crucible, with layings of brimstone, saltpetre, and saw-dust, and these taking fire, in a good heat, will soon cause the metal to run, and save you much labour.

439. To put a good temper on any Edge-Tool.—When you have made your edge-tools of hard metal, heat them red-hot in the fire, and dip them in cold water, wherein soap has been dissolved; after that hold them on hot coals until the edges begin to grow yellow, then drop tallow on them, and dip them in cold water, and the temper will be very excellent for use.

440. To Tinge Iron of a Brass Colour.—Melt iron in a crucible, casting on it sulphur-vivæ; then cast it into small rods, and beat it into pieces, for by this means it will be very brittle, so put in aquafortis, dissolve it, and evaporate the menstruum, then with a strong fire, reduce the powder into a body again, and it will be of a good brass colour, scarcely discernable from that made of copper.

441. To make Iron a Gold Colour.—Take the powder of alum, melancy, and sea water, mix them till the powder is well dissolved, then heat a bar of iron red-hot, and often quench it in this, and it will produce a gold tincture.

442. To make Iron a Silver Colour.—Take sal ammoniac in powder, and mix it with unslacked lime; put them in cold water, let them dissolve there, then heat the iron, and being when red-hot quenched therein, it will be as white as silver.

443. To Tinge Lead of a Gold Colour.—Take lead that is well purged from the dross, one pound, an ounce of well powdered sal ammoniac, half an ounce of saltpetre, and two drams of sal elbrot, put them into a crucible two days, on a gentle fire, and the lead will be thoroughly tinged.

444. To Solder upon Silver, Brass, or Iron.—For soft solder that runs soonest, take brass four penny-weights, silver five penny-weights, melt and mix them well together.

Notices to Correspondents.

A Pupil—is informed that a receipt for making Ink to write on Linen, and also another for preparing Black Beer, will be given in next number.

An Artisan—is invited to forward the other *Turkish Receipt*, for fixing diamonds on gold or silver.

J. M'C. Greenock—is informed that the 3rd number of the Dirge, and also the 3rd number of the Arcana, will be published previous to commencing the 3rd part of this work. Your friendly suggestions respecting the paper will be attended to. The portrait is given gratis—and I shall cause some to be left with my agent, for each of my Greenock subscribers.

Author's Address to his Readers.

In concluding *this* the second part of the *Chemical Experimentalist,* I feel called upon to express my heartfelt gratitude for your liberal patronage to this work, which has far exceeded my most sanguine expectations; when I first commenced it, I hoped that in a mercantile manufacturing CITY like GLASGOW, whose sons emulate the world in the *practical* cultivation of the *Arts* and *Sciences,* I might without much risk venture a small edition—but to your honour, in *but* a very few weeks the first part ran through three large impressions: such an extended sale induced me to throw off very large editions of each of the numbers of the second part, but in which I find myself again as agreeably disappointed as before —by an exhausting sale of the early numbers; in fact, I must apologize for the irregular intervals of publication between many of the latter numbers, and the true apology is simply to state the reason; the reason *then,* my enquiring readers, was merely the result of your favourable reception of the work; and my wish to *meet* and foster your insatiated desire (after *Rational Amusement* and *Truly Useful Knowledge*) by *reprinting,* as fast as possible, the *outsold* numbers, the consequence was, my printer has been unable to bring forward the new numbers so early as I could have wished, but in future numbers, I shall endeavour to attain to more regularity in the publication.

The third part of this work will contain Extracts from Dr. Ure's Lectures, and many of the processes of sugar-boiling and crystallizing, viz. from its first extraction from the *cane* in India, till its reduction to sweatmeats, in this country—Galvanism—Fireworks—Ballooning—Messotinto Engraving—and other useful receipts and Chemical Experiments will be introduced, so as that the third part may not rank behind either the *first* or *second,* for amusing, recreative, rational, and *truly useful knowledge;* hoping, on these grounds, as usual, it will receive your liberal support and patronage, I shall forthwith proceed to arrange with my printer for its regular periodical appearance, and now to conclude, bid you all—ADIEU !

137, *Argyle-Street, Glasgow,*
10*th January,* 1835.

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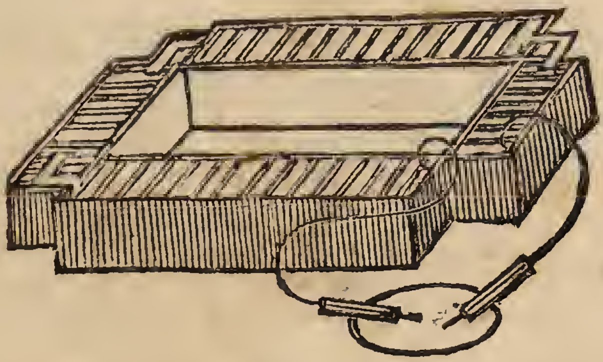
THE

CHEMICAL EXPERIMENTALIST,

OR,

An attempt to allure by Experiment,
AND GUIDE BY REASONING,
THE ENQUIRER AFTER
RATIONAL AMUSEMENT and USEFUL KNOWLEDGE;
Towards the cultivation of the simple and sublime Science—
CHEMISTRY.



BY JOHN KNOX STUART, M. D.
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AUTHOR OF
"THE MONITOR" on Consumption—"THE SILENT FRIEND,"—"THE DIRGE" on Cholera—"THE ARCANA OF LIFE,"—"THE REFORMER'S ALMANACK, &c. &c.

Decomposition is that death-like scene,
Where Nature's laws decree, incessant, universal change;
While Composition's generative womb,
Prolific, gives birth, new form of life, and re-creates the whole.

PART THIRD.

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MDCCCXXXV.

Stuart's Useful Information for the People, No. 24,

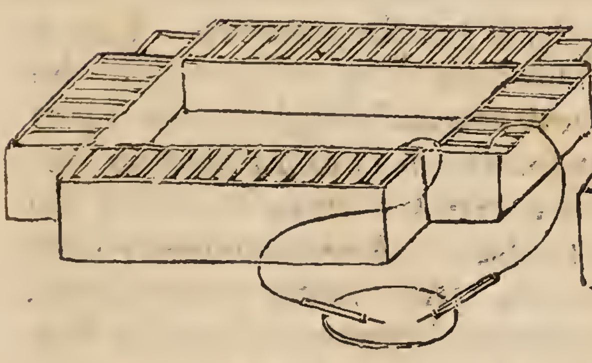
Being No. 13, of the

CHEMICAL EXPERIMENTALIST.

CHEMISTRY.

GALVANIC TROUGHS OR BATTERIES.

448.



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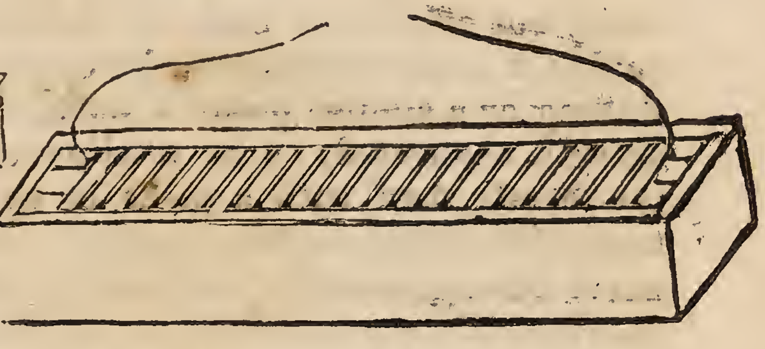

450. The above *Galvanic Battery* (448) is composed of four of Cruickshank's *troughs* (449) connected at the ends, and *thus* any number of troughs may be added together, till we have the galvanic power wanted.

451. To prepare Cruickshanks' Galvanic Trough.—Mr. Cruickshanks, of Woolwich, invented the Galvanic Trough 448, which has proved of very great importance to science. It may be prepared thus:—let a trough be made of such length as you choose, and let its depth and width correspond to the size of your intended plates —let it be made of wood well baked, cut with grooves in the insides and bottom, at the distance of seven-eights of an inch, for the insertion of the edges of the copper and zinc plates, these copper and zinc plates must be soldered together, and cemented into the grooves of the trough with proper cement, (452), and the galvanic battery is complete. I consider this a very simple apparatus, and taking into consideration the surprizing effects of this engine's operations, I think no family should be without one.

452. Cement for a Galvanic Trough.—Take six pounds of yellow resin, one pound of red ochre, half a pound of sulphate of lime, (236), and a quarter of a pint of lintseed oil; let the ochre and sulphate of lime be well dried, and then add the other ingredients in a melted state.

453. SINGER'S CEMENT FOR ELECTRICAL APPARATUS.—Take five pounds of resin, one pound of bees-wax, one pound of red ochre, and two table spoonfuls of plaster of paris, (see 238); let all be melted together, and this excellent cement is formed.

454. TO CHARGE THE GALVANIC BATTERY.—Mix one part of nitric acid (184 part 1st) with twenty or thirty times its weight of water, pour this mixture into the trough, and immediately a highly energetic action is the result. The trough is provided with wires at each end, which are in opposite states of Galvanism, and may be applied to any substance which it is proposed to subject to its influence.

455. ELECTRIC MATTER THE CAUSE OF MUSCULAR MOTION.—Lay bare the sciatic nerves of a frog, either alive or having its head recently cut off; slip a piece of tinfoil under one of the nerves, and double it so as to embrace the nerve by a gentle pressure. Lay a shilling or a similar piece of metal under the leg with which the nerve is connected, so as to allow the knee and thigh to rest upon the metal; then with a piece of wire make a communication between the tinfoil and the shilling. Instantly the limb to which the nerve belongs is convulsed; and a convulsion takes place every time the metallic communication is formed, after being interrupted, though repeated ever so fast. It is observed however that the first convulsion after a pause of any length of time was the strongest.

No effect whatever takes place when a piece of glass or of sealing wax is used instead of the wire.

This certainly looks very like electric matter; but there is another fact, which seems to discord with that supposition. Lay the shilling under the limb whose sciatic nerve is not in contact with the tinfoil, and make the communication as before, a convulsion does take place, but it is in the same limb as in the last experiment, to wit, in that round which the tinfoil is wrapt, while the limb under which the shilling lies, remains unmoved. The same is true, in whatever part of the body the shilling is laid, under the forefeet, or any other part, as under the skin even close to the nerve connected with the tinfoil. In all these cases the convulsion takes place in the same limb, and in *that only*, which points out that the phenomenon depends upon an action performed upon the sciatic nerve itself, and not by the transmission of electric matter through the convulsed limb.

This experiment was made in Italy by Mr. Valli of Pisa; it was owing it is said to what follows.—A student of medicine dissecting a living mouse, and holding the knife by the blade, felt a shock or numbness similar to what the torpedo gives. It seems extraordinary that this should have happened, because in the experiment of the frog the convulsion is not produced when the communication between the two metals is made by the finger and thumb. On the contrary, no effect whatever takes place on that occasion.

456. COURONNE DES TASSES.—This is a simple form of constructing a battery, (see 447)—merely get two or more arches made in the form of those represented in the figure, and let the one end of each arch be made of copper, and the other of zinc, soldered together in the middle; let them be immersed in tumblers of glass, as seen in the figure, and let a copper and zinc leg be put into each tumbler, and the battery is complete.

457. A THOUSAND-GRAIN, OR SPECIFIC-GRAVITY BOTTLE.—This bottle has a slender neck, and is furnished with a ground conical stopper, in the side of which there is a notch, by which the redundant liquor escapes, when the stopper is put in; when the bottle has been completely filled; it is adjusted by filling it with distilled water at 60° Fahren. and then finding out what weight will exactly counterpoise or ballance it.

458. MANNER OF ASCERTAINING THE SPECIFIC GRAVITY OF FLUIDS BY THE THOUSAND-GRAIN BOTTLE.—This instrument does not require the aid of any computation, but is merely filled with the fluid to be examined, and placed in one of the scales of a balance, while the *counterpoise* is placed in the other; if the fluid under examination be lighter than water, it will require as many grains to be added to the scale that contains it, as shall be sufficient to restore the equilibrium, those grains which required to be added to restore the equilibrium must be substracted from a thousand, and the remainder will give the *gravity;* on the contrary, if the fluid to be examined be heavier than water, as many grains must be put into the equipoise scale, and these grains added to a thousand will give the specific gravity of the heavy fluid.

459. TO PREPARE LEESON'S GAS BOTTLES.—Take an Indian rubber bottle, and boil it till it is completely softened, which it will in general become in about twenty minutes; then let a condensing syringe be firmly tied in its mouth, and force air into the bottle, when it will gradually enlarge till its circumference is above sixty inches; it may now be fitted with a stop-cock and filled with gas, and will form an excellent and safe appendage to an oxy-hydrogen blow-pipe—should an explosion take place, it could only burst the bottle.

460. TO GRANULATE GOLD, SILVER, OR COPPER.—Let either of these metals be melted, and poured from a height of several feet, in a fine stream into a vessel of water.

461. TO GRANULATE OR FRETTERIZE LEAD.—Get a small iron ladle, and make two or three holes in its bottom about the size of pins; melted lead poured into this ladle, two or three feet above a pail of water, will reduce the whole to a parcel of fritters.

462. TO GRANULATE TIN.—Get a wooden box, and let it be rubbed on the inside with chalk; then melt the tin and pour it

into the box, on which fix the cover and shake it briskly, the concussion of the metal against the sides of the box, when fixing, will reduce it to a fine powder, from which the chalk must be washed with water.

Note. Lead may be granulated after the same manner.

463. TO CLARIFY SPIRITS BY CREAM.—Take one or two spoonfuls of new cream to the pint of *muddy spirits*, and let the spirits and cream be agitated together; then let all be filtrated through a flannel bag, or paper *cone*, to separate the cheesy matter, and the spirits will be well clarified.

464. TO PREPARE FRANKFORT BLACK.—Merely let *argol* be well washed and ground with water; it is used to make *Printer's Ink.*

465. TO BURN LAMP BLACK.—Heat lamp black in a covered iron pot, it is thus freed from its greasiness, and is rendered fit to be used as a water colour.

466. TO MAKE NEW WINES HAVE THE QUALITIES OF OLD—ESPECIALLY PORT AND MADEIRA.—Merely heat the wine up to the boiling point, or when newly bottled set it in the light of the sun for a time, and it will deposit its tartar; in the course of a day, it will have acquired the qualities of wine several years old.

467. TO PREPARE RENNET, RUNNET, STEEP, OR YEARNING; FOR COAGULATING MILK TO FORM CHEESE.—Wash a calf's stomach-bag clean, and salt it thoroughly, inside and out; in two or three days, the salt left on it will run; let it be hung up to drain for two or three days, and then salted again, put it into a jar, and let it be covered with paper pricked with pin-holes.

468. TO PREPARE THE RURNET FOR USE.—Take a handful of sweet-briar leaves, dog-rose leaves, bramble leaves, and three or 4 handsful of salt, and boil all in a gallon of water for a quarter of an hour, and when quite cold, let the salted *maw* be added, also a lemon stuck round with cloves, (say a quarter of an ounce), and scum when necessary.

469. TO PREPARE GLOUCESTER CHEESE.—First let the warm milk from the cow be coloured, by rubbing down on a stone some annotto, about one ounce for each cwt. of cheese, and mixing it with the milk; then add about one-third of a pint of rennet to fifty gallons of milk; as soon as the milk is curdled, strain off the whey— break the curd small—put it into a vat and press gently for two hours, then turn again and press for six or eight hours, turn again and rub both sides with salt, press again till pressed enough, say in 18 hours; then dry on boards, turning every day.

470. TO PREPARE A FINE HEALTHY GINGERBREAD.—Dissolve half an ounce of potash, and half as much alum, in warm water, and in

that mixture, dissolve one ounce of butter, and again mix all up into a stiff dough, with one pound of fine pollard, three-fourths of a pound of treacle, and an ounce of mixed spices, keep it several days till it rises, now put it into the oven, and afterwards keep a considerable time—it improves by keeping.

Note. The alum may be omitted, and common magnesia is superior to potass, and more healthful. An alkaline carbonate is necessary to combine with an acid of the treacle, and thus by the alkali (the potass or magnesia) combining with the acid, the carbonic acid (see 60, 89) is set free and causes the gingerbread to rise, therefore as carbonate of magnesia (see 225) is quite a safe substance in the stomach, it may be used in any quantity, and thereby the gingerbread may be raised and made fit for baking in a few hours.

471. To prepare Gingerbread Dough, which shall be ready for the oven in half an hour.—This is effected by disengaging the carbonic acid from the magnesia, by means of tartaric acid,—four pounds of flour mixed with one ounce of magnesia, and the usual spices, made up with three pounds of treacle, four ounces of butter, and the requisite quantity of water, in which three-fourths, or an ounce of tartaric acid has been dissolved, will be ready for the oven in half an hour.

Note. Instead of tartaric acid, super-tartrate of potash (cream of tartar) may be used, and if (volatile salts) carbonate of ammonia be used instead of common potass, and the alum omitted—tbe bread is fit for the oven, so soon as it is kneaded.

472. Adulteration of Bread by Bran-water.—Boil five pounds of bran in four gallons of water, till only 3¾ gallons will strain—make 56 lbs. of flour into bread with this water, and it will produce 83 lbs. of bread, while the same weight of flour, with plain water, will only produce 69 lbs. of bread. The bran-bread contains 12 lbs. of water.

473. POTATOE FLOUR BREAD.—Boil, peel, pulp, and knead 16 lbs. of potatoes with 26 lbs. of flour, and 40 lbs. of bread will be the produce; therefore, he who buys 40 lbs. of such bread, buys 8 lbs. of water, as 16 lbs. of potatoes contain only at outmost, 3 lbs. 3 oz. of farina.

474. To make syrup CAPILLAIRE.—Dissolve in water, the broad ends *only* of sugar loaves, with either breaking or bruising them, (as otherwise the syrup would be cloudy); add to each pint of the syrup, an egg broken in pieces; stir the whole together, give it a boil and strain through flannel; when cold, add to each pint an ounce of orange or rose water. To give this syrup a rich appearance, dissolve your tragacanth in it.

475. To prepare Brandy Colouring.—Put brown sugar into an iron pot, and heat it till it melts, stir it till it becomes dark and bitter, then add lime water to form a syrup, and you will have good brandy colour.

476. To prepare Indian Sealing-Wax.—Melt stick-lac with scio-turpentine and chinese vermillion.

477. To prepare the best Dutch Sealing-Wax.—Melt 2 lbs. of light coloured shell-lac, then add half a pound of venice turpentine, then 1½ lbs. of chinese vermillion; stir all well together, and when cold enough, form into sticks.

478. Soft Red Wax for Official Seals.—Take 4 lbs. of white wax, 1 lb. of venice turpentine, and colour red with vermillion in fine powder; pour out on a hard-wood board, moistened, and form it into large rolls.

Note. This soft wax is also used as a cement.

479. To prepare Boiled Oil for Painting.—Oils of lintseed and walnut are rendered *drying*, by being boiled with white lead, red lead, sugar of lead, litharge, German or white vitriol, using about four ounces of either to the gallon of oil.

Note. The pure sulphate of zinc made in this country has not the same drying qualities as the *common white vitriol* imported from Germany.

480. To prepare Oil for Painting on Velvet.—Take very clear lintseed oil, one pint; and to make it drying, boil it for two hours with sal-ammoniac and sal-prunelle, of each twenty grains; then put in a piece of bread soaked in oil of vitriol, and three large onions cut in pieces, and continue the boiling for another hour, then strain through a coarse cloth.

481. Callot's Engravers' Hard Varnish for using with Aqua-fortis—Is gum mastic dissolved, by boiling in an equal weight of drying lintseed oil.

482. Le Boffe's Soft Varnish for Engravers.—This is a varnish generally used in this country, it is made by heating two ounces of white wax, and adding to it by degrees, first one ounce of mastic in fine powder, and then one ounce of asphaltum, keeping it on the fire till it is completely dissolved.

483. Lowry's Engraver's Varnish—Is four ounces of asphaltum, two ounces of burgundy pitch, and two ounces of white wax, melted together.

484. Engraver's Soft Varnish—Is prepared by adding some veal suet to Le Boffe's, (see 482).

485. Le Blond's Varnish for Prints.—To four pounds of balsam capivi, add one ounce of gum copal powdered, and expose it to the sun till dissolved, adding ounce after ounce, till one pound is dissolved, then dilute with scio-turpentine, as thought necessary.

Stuart's Useful Information for the People, No. 25,

Being No. 14, of the

CHEMICAL EXPERIMENTALIST.

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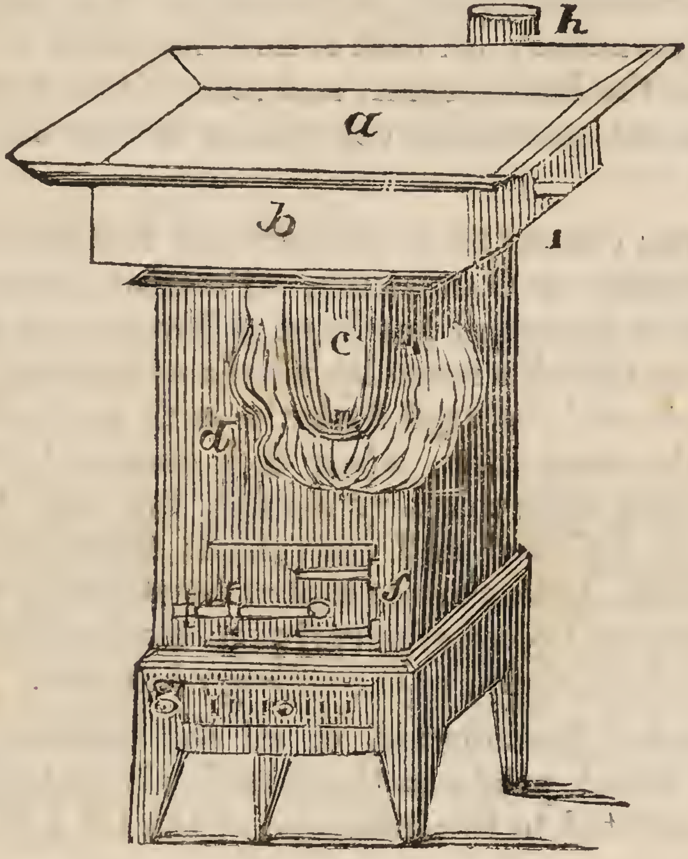
486. THE PORTABLE EVAPORATOR—FOR DRUGGISTS, CONFECTIONERS, &C. WHEREBY SUGARS—SYRUPS—LOZENGES—JUJUBES—AND WORTS, FOR BREWING—MAY BE EVAPORATED. ALSO, SUGAR-BOILERS, RECTIFIERS, AND VARNISH-MAKERS, WILL FIND IT A VALUABLE APPARATUS.



487. PROFESSOR JEAN ALDINI, OF THE UNIVERSITY OF BOLOGNE—HIS GALVANIC EXPERIMENT ON A DOG, WHOSE HEAD WAS SEPARATED FROM ITS BODY, (see fig. 446, in the Lithographic Print fronting page 90).—ALDINI separated the head of a dog from its trunk, and laid them on a table, with an interval of half a foot between them. He now made a communication between one of the ears of the dog's head, and the bottom of the GALVANIC PILE; he next made a small incision either in one of the extremities, or into the abdomen, and made a communication between this incision and the top of the *pile*, as seen in the *figure;* when *all at once* a quick and lively motion of the extremities of the body took place;—that *single contact* excited convulsions truly frightful, over the whole body, while the head was no less excited—the mouth opened, the teeth knashed, the eyes rolled in their orbits, and if reason had not

arrested or astonished imagination, we had almost believed that the animal was restored to suffering and life; the same effect took place in a public meeting, held at *l'hopital de la charitè à Paris*, the head being separated from the trunk, the distance of one foot and a half. The same phenomena or experiment may be exhibited in a manner yet more striking, by making the experiment on a horse, having its head separated from its trunk, to the distance of three feet and a half.

488. RULES FOR GALVANIZING THE HEADS AND BODIES OF ANIMALS SEPARATED FROM EACH OTHER.—In the preceding experiment, it is always necessary that the interval of the table which supports the separated head and trunk of the animal, be made wet with a solution of salt in water, or some other fluid, when so situated the head and trunk present mutually, extremities of a conducting arch to the action of galvanism; all that is now required is to complete the circle between the head, trunk, and *pile*, (as seen in the figure) when a simultaneous spasmodic convulsion of the head and trunk will be obtained.

489. PHENOMENA OBSERVED IN SUBMITTING THE SEPARATED HEAD AND BODY OF A HORSE TO GALVANISM.—Professor Huzard, and the Commissaries of the National Institute of France, at the School of Medicine in Paris, killed a horse by means of blowing air into the jugular veins, separated the head from the body and submitted both to galvanism at the same time, when they observed that the convulsions in the body were not very violent, but that the head appeared very much agitated and convulsed; there was a sensible grinding of the teeth, analagous to that of mastication and grinding of food, which was an object of surprize to many spectators, there was even a sensible secretion of the salivary humour.

Note. The head of the horse is, of all the animals submitted to experiment, that which produces the most lively and striking movements, when submitted to the influence of GALVANISM.

490. COST OF A COMPLETE OIL GAS-FORMING LAMP, SUCH AS I HAVE EXHIBITED BURNING AT MY LECTURE-ROOM.—The jet 1s6d the stop-cock, 1s.6d, brass pipe, 1s6d, tin stand and fountain lamp, 1s.6d.—in all, 6s.—not much more than the price of a *gas-company's* argand, laying meters, pipes, cocks, and extortion, all to one side. This lamp is cheap, neat, clean, gives a pure light, and in fact just requires the public to open their eyes to its advantages, in order to ensure its general adoption, and secure the public from the domination of JOINT STOCK GAS-MONOPOLISTS.

491. FABBA, OR ALGERINE CEMENT.—Take two parts of ashes, three parts of clay, one part of sand; mix with oil, and use as mortar. This cement resists weather any length of time.

492. TO GIVE SOAP PREPARED FROM OIL AND ALKALI A BEAUTIFUL YELLOW COLOUR.—Mix in a retort, one part of muriate of ammonia,

and two parts of lime, (234, 235), apply heat, and ammoniaca gas will be liberated in abundance; convey this gas by means of a pipe into the vessel when the soap is boiling, and in a very short time it will have acquired a beautiful yellow colour.

493. SOMETHING NEW.—TO PREPARE AN ARGAND CANDLE.—Take a piece of wire, about the thickness of a quill, and of the length you wish to make your candle, smear it with hogs' lard or oil, and wrap round it some cotton lamp-*wick,* and fix it in a candle mould; then pour melted tallow into the mould; let the mould stand till the melted tallow is cold and set, then draw it, and also draw out the wire, and the hollow canal up the middle of the candle will supply the interior of the flame of the candle, when burning, with plenty of rich air; and thus, *says an acquaintance of mine,* a candle is made that will burn without smoke.

494. THE ARGAND CANDLE CANDLESTICK.—The Argand Candle Candlestick must have a hole passing through its stalk from side to side, below the lower end of the candle, to admit air to pass up the funnel or pipe of the candle.

495. A SECRET FOR BLACKING-MAKERS.—The phosphoric acid given out by the ivory black, when acted upon by sulphuric acid, is of a shining appearance, and is that substance which imparts the shining lustre to good shoe-blacking.

496. A NEVER-YIELDING CEMENT.—Pound calcined oyster-shells, sift the powder through a silk sieve, and grind it on a porphyry slab, till reduced to the finest powder; then take the *whites* of several eggs, according to the quantity of the powder, beat them well, and having mixed them with the powder, form the whole into a kind of paste: with this paste join the pieces of china or glass, and press them together for seven or eight minutes, and the united parts will stand heat and water, and will not come apart if they should fall on the ground.

497. A SINGULAR METHOD OF ORNAMENTING WATCH CASES WITH DIAMONDS AND PRECIOUS STONES.—*Extracted from W. Eton's Turkish Empire.*—The Jewellers, who are mostly armenians, have a singular method of ornamenting watch-cases, and similar things, with diamonds and other precious stones, by simply glueing them on. The stone is set in silver or gold, and the lower part of the metal made to correspond with the part to which it is to be fixed; it is then warmed gently, and the glue applied, which is so very strong that the parts never separate.

RECEIPT.—Dissolve five or six bits of mastic as large as peas, in as much spirit of wine as will suffice to render it liquid; in another vessel dissolve as much isinglass, which has been previously soaked in water (but the water must not be used) till it is swollen and soft in as much brandy or rum as will make two ounces, by measure, of *strong glue,* and add two small bits of gum galbanam ammoniacum, which must be rubbed or ground till they are dissolved; then mix the whole with a sufficient heat. Keep it in a phial stopped, and when it is to be used, set it in hot or boiling water.

498. TO PREPARE BLACK VARNISH.—Dissolve half a pound of sandarac, and a quarter of a pound of yellow rosin, in half a gallon of spirit of wine, and then add two ounces of lamp black to colour it.

Note. It may also be prepared by dissolving *black sealing-wax* in spirit of wine.

499. TO PREPARE A FINE FIDDLER'S ROSIN.—Melt rosin with a little vinegar, which will render it clammy—it is then fit for fiddlers to rub their bows with.

500. THE VERY BEST SOLVENT FOR INDIAN-RUBBER.—Oil-gas oil is the best solvent for Indian-Rubber, one thousand feet of this gas when compressed, gives nearly a gallon of this oil; it may be had where oil-gas is compressed to fill portable gas-lamps; this gas is compressed to one-thirtieth of its bulk.

501. THE VERY BEST MANNER TO RESTORE TRANSPARENCY OF SPIRITS AFTER HAVING BEEN RENDERED CLOUDY BY DILUTING WITH WATER.—Mix a little alum, with as much sub-carbonate of potass, and mix all with the spirits—or *else* and better—dissolve some white sugar in cold water, then beat some white of an egg with it, and then mix it with the spirit. In three or four days the spirits will be completely depurated; a great quantity of sediment having fallen down which may be separated by a filter,

502. TO PREPARE THAT BEAUTIFUL COLOUR, CHROME SCARLET.—Boil sixty-seven parts of white lead, with eighty-two parts of chrome yellow, (see 190), in a sufficient quantity of water; the carbonic acid (see 60) flies off, and the oxide of lead unites with the chrome yellow: this is Dulong's method.

503. GROVELLE'S METHOD.—Boil forty-one parts of chrome yellow, and eleven parts of sub-carbonate of potass; the carbonic acid flies off as before, and the potass unites with one half of the chromic acid, leaving the other half in combination with a double portion of oxide of lead.

Note. Chrome Scarlet is a good oil colour, and mixes well with white lead.

504. FUSIBLE METAL FOR METALLIC PENCILS.—Eight ounces of bismuth, five ounces of lead, and three ounces of tin; melt at 202° Fahren but equal parts of each is not so soft, and is used as metallic pencils, which write on paper, having burnt hartshorn rubbed on it, leaving marks as fine as those of black lead, and not so easily rubbed out, being permanent as ink.

505. METAL SPOONS WHICH MELT IN HOT WATER.—Pour into a metal tea-spoon mould, a mixture of eight parts of bismuth, five of lead, three of tin, and one of mercury.

506. TO SILVER LOOKING-GLASSES.—Amalgamate some tin and quicksilver, by spreading the tinfoil on the back of the glass; then pour some quicksilver over it, and spread it with a hare's foot; then slide another glass over the tin to drive off part of the quicksilver; now lay a board over the glass and cover it with weights, to expel the superfluous quicksilver, and in a short time it will adhere, and the looking-glass is formed.

507. SILVERING FOR GLASS GLOBES.—Dissolve one pound of bismuth or tin, in four pounds of quicksilver, then having your glass globes clean and dry inside, heat the above amalgam till it be perfectly liquid; then pour it into the globe by a paper funnel, and turn the globe round in various directions, so that the amalgam, as it crystallizes by cooling, may adhere to all parts of the globe, when the superfluous amalgam may be poured out.

508. TO PREPARE FULMINATING QUICKSILVER.—Take 100 grains of quicksilver, and dissolve it without heat, one and a half ounces, measure, of nitric acid, (see 184), then pour the solution upon two measured ounces of spirit of wine, and apply heat till the liquid begins to effervesce, and a white powder will fall down and collect at the bottom, which must, without loss of time, be separated by a filter, and washed with distilled water and dried.

Note. This preparation should only be prepared in small quantities at a time, on account of its danger of exploding.

509. NITRIO-MURIATIC SOLUTION OF GOLD.—Take four ounces, by measure, of muriatic acid, (see 103), and mix it with one ounce of nitric acid, (see 184), this forms aqua regia, (see another kind, 403); and after these acids have been mixed some hours, add grain gold (see 460) till no more will dissolve. From this solution is prepared Cassius's purple precipitate, which is used to gild metals by the *rag*, and also to gild steel.

510. TO PREPARE CASSIUS'S PURPLE PRECIPITATE.—Dissolve a few grains of grain-tin (462) in muriatic acid, (spirit of salt), dilute this solution with a large quantity of distilled water, say a gallon to the dram measure of the solution, and drop into the diluted liquid, 20 or 30 drops to each gallon of the nitro-muriatic solution of gold, (509), and in *three* or *four* days a purple precipitate will be formed, which must be filtered, washed, and dried.

Note. This powder is used to colour glass a purple colour when melted in open vessels exposed to the air.

511. AN ALARM TO DETECT EVE-DROPPERS, ROBBERS, OR TILL-SCRAPERS.—Lay detonating silver (see 405) on a piece of paper;

then lay a small hollow glass bead on the top of it, and fold them in that position tightly up in the paper; then either put one of them into the key-hole, at the edge of the *till*, or where you expect the intruder to tread, and immediately on its being touched with force, it will explode with a stunning report.

512. To prepare Solder for Silver.—Melt three parts of silver with seven of copper, or four of silver with six of copper.

513. To prepare Iron Liquor for Dyers and Calico Printers.—Dissolve some copperas (see 8) in water, also some sugar of lead; mix both solutions together, and you will have formed *Iron liquor.*

514. To prepare ROUGE and Crocus.—Calcine copperas by itself in a strong heat, in an earthen dish, the scarlet parts are called ROUGE and those parts which have been exposed to the strongest heat has been called *Crocus.*

515. To prepare JEWELLER'S ROUGE.—Dissolve copperas in water, filter, and add pearl-ash or soda, so long as any sediment falls; filter again, wash and calcine till it assumes a scarlet colour.

516. Composition to Brown Fire-Arms.—Take of nitric acid half an ounce, sweet spirit of nitre half an ounce, blue vitriol two ounces, tincture of steel one ounce; mix all together in eight gills of water, apply this mixture with a sponge, then heat the barrel a little, and remove the *oxide* from the barrel with a hard brush.

Note. This operation may be repeated a third and fourth time, till you have the brown required; it is then to be carefully wiped and sponged with boiling water, in which there has been put a small quantity of potass. The barrel being taken from the water must be made perfectly dry, and then rubbed smooth with a burnisher of hard-wood; afterwards heated to the heat of boiling water, and varnished with the following varnish.

517. Varnish for Gun-Barrels that have undergone the process of Browning.—Take of spirit of wine two parts, dragon's blood, powdered, three drams; shell-lac, bruised, one ounce; and dissolve all together: this varnish being laid on the barrel, and become perfectly dry, must be rubbed with a burnisher, to render it both smooth and glossy.

518. To Black Varnish Iron.—Merely heat the iron red-hot, and rub it over with a ram's horn.

519. TO TEMPER RAZORS.—First rub them on a *grit* stone until they are bright, then put their backs on the fire, and in a short time the edge will become of a light straw colour, whilst the back is blue, this straw colour denotes the proper temper for either razors, gravers, or pen-knives; pen-knives are generally covered with oil before they are exposed to the fire to temper.

520. SOLDERING FOR IRON.—Melt in a crucible some filings of *soft cast iron*, with borax, which has been previously calcined to get rid of its water, and a shining black pitch-like soldering substance will be obtained, being a glass of borax calcined with iron.

521. TO SOLDER IRON. –Apply sal-ammoniac to the internal joinings or overlapping edges of sheet-iron, then powder some of this black solder, and lay it along a portion of the joint, and so soon as it is melted over a clear forge fire, the soldered part must be placed over the beak of an anvil, and beaten quickly with a light hammer, as long as the heat permits.

522. TO SOLDER STEEL.—Melt five ounces of borax in an earthen crucible, then add half an ounce of sal-ammoniac, and pour the melted matter on a tin plate; when cold, it appears like glass; let it then be powdered, and mixed with an equal quantity of *unslacked lime;* now heat the steel to a red heat, and sprinkle a little of this powder on the surface, when it will melt like sealing-wax; let the steel or even iron be again heated, but much below the ordinary welding heat, then brought to the anvil and hammered, till the surfaces are perfectly united.

523. TO PREPARE SCHEELE'S GREEN.– Dissolve two pounds of blue vitriol in three gallons of boiling water, and again dissolve two pounds of pearl-ash, with eleven ounces of white arsenic in another gallon of water; filter the two solutions, and add the filtered solutions together, but taking notice to add the solution of the blue vitriol by degrees while hot; then wash with cold water and you have prepared the beautiful pigment.

524. THE WAY TO TIN COPPER.—Scrape its surface, then heat it, and sprinkle a little rosin mixed with sal-ammoniac upon it, when a mixture of lead and tin, melted together, is poured upon it, and spread evenly over its surface by means of a cloth many times doubled.

525. THE FRENCH PREPARATION TO TIN COPPER.—Melt together eight pounds of tin, one pound of iron turnings or small nails in a crucible, with a handful of salt or pounded glass, to keep the air from the metals while they are melting.

526. SPECULUM METAL—MUDGE'S COMPOSITION.—A little less than one part of tin to two of copper, the metals require first to be melted together, and then thrown into water to granulate it, it is then melted again, and the speculum must be cast with its face downwards.

527. SILVERING AND GILDING BY POWDERED TIN.—Let the granulated tin (462) be reduced by means of a solution of glue in water to the consistence of cream, and let it be laid on with a soft brush, like ordinary paint, it has then the appearance of a coat of common

grey water colour, pass over it with an *agate burnisher*, and it will exhibit a bright uniform surface of polished tin; a coat of white or gold coloured lacquer ought to be immediately laid over it in imitation of silver or gold.

528. TO PREPARE FALSE SILVER.—Put ten parts of copper shreds into a crucible, with rather more than one part of the regulus of arsenic, cover the crucible and melt the whole together, and so soon as the whole is melted, pour it out.

529. TO PREPARE PLUMBERS' SOLDER.—Melt together two parts of lead with one of tin, in a gentle heat, and pour it into moulds made in the sand, it is useful to join sheets or pipes of lead together.

530. PRINTERS' TYPE-METAL—is composed of four parts of lead, and one of the regulus of antimony, melted together.

531. FLOATING BRICKS, WHICH SWIM ON WATER.—Bricks made of fossil meal, float on the water; they have been recommended to form floating batteries on the water; a brick of this kind, of the usual size, instead of weighing five and a half pounds, will weigh, after being burnt, only fourteen ounces.

532. *To Change the Colour of Yellow Cornelians to a fine Rich Red.*—Let them be exposed to the heat of a fire for twelve hours, in a crucible covered with sand.

533. *To prepare Nitrate of Strontia—so useful for giving the red flaring glaze of blood to Fireworks, and spirituous flame.*—Dissolve native carbonate of strontia in weak nitric acid, and evaporate and crystallize, (see its uses).

534. *To procure DEAD Lime, which sets under water.*—Take of those small pieces of lime which have fallen through the grate into the ash-pit of a lime furnace, they are imperfectly burnt, and are called *dead lime*, because they will not slake in water; but let them be ground and made into a paste with water, and it will set under water.

535. TO STAIN MARBLE.—Heat is always necessary for staining marble, the marble must not be made *red*, but it must be so hot as to make the liquor boil on its surface.

Notice to Correspondents.—In next number will appear—The *Universal Magnet*—To case-harden steel in a minute—To make cast-metal pipes which leak waterproof—Hatters' Varnish—Secret to make Hats waterproof—Black Beer—Indeliable Ink for Linen —The Comet—B. W. M.—An old Pupil, Falkirk.

☞ Want of room prevents an explanation of the Portable Evaporator, (486), but it will be given in next number.

Stuart's Useful Information for the People, No. 26,

Being No. 15, of the

CHEMICAL EXPERIMENTALIST.

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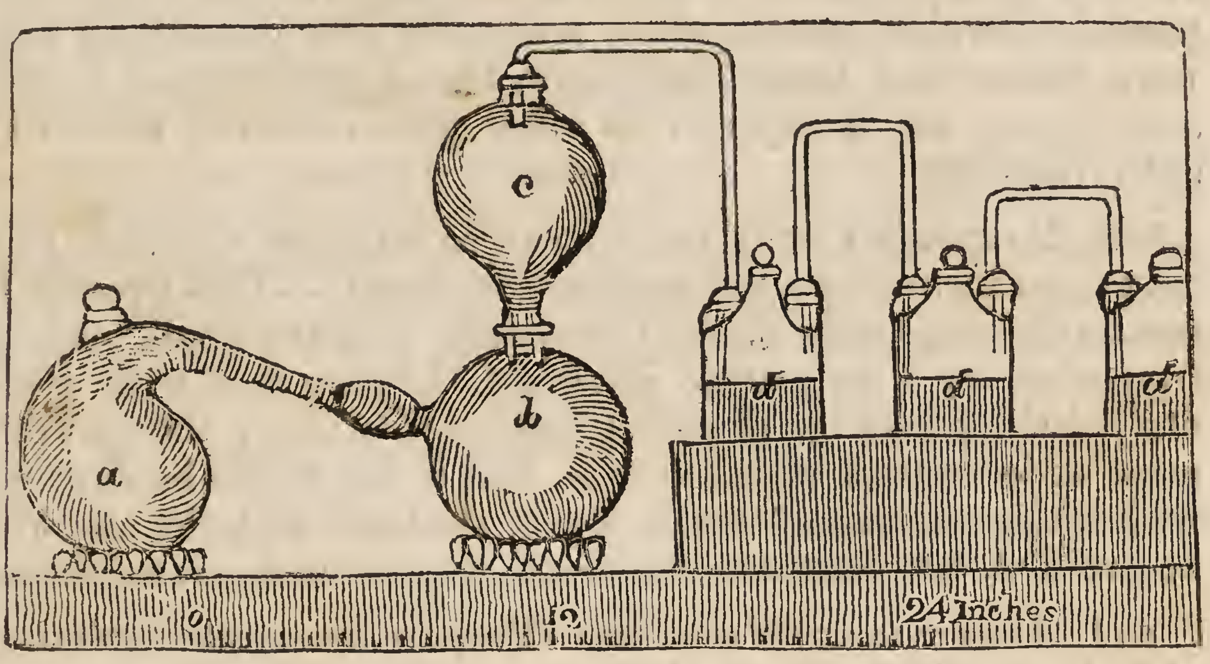
536 MR PEPY'S IMPROVEMENT OF WOULFE'S APPARATUS, (see 378.)



537. DESCRIPTION OF PEPY'S IMPROVEMENT.—To properly understand Pepy's Improvement of Woulfe's apparatus, it will be necessary for the student to recur to Figure 378, and its explanation, Article 392, when it will easily be understood, in what this improvement consists. In Fig. 378 there is an immediate connection between the balloon *b*, and the receiver *c*, but in Pepy's construction, the balloon *b*, is surmounted by a vessel *c*, which is accurately ground, and furnished with a glass valve. This valve allows the gas to pass freely into the vessel *c*, but prevents any water from falling into the balloon *b*, therefore this apparatus has this excellence, that, in the event of rapid condensation in the retort *a*, and balloon *b*, accident, and all chance of exploding is avoided; from the hinderance of the rushing of the liquids contained in the receivers *d*, *d*, *d*, into the balloon and retort *b* and *a*.

538. FAREY'S IMPROVED LAMP, WHEREBY THE WICK OF A LAMP MAY BE SUPPLIED WITH OIL, WITHOUT THE RESERVOIR BEING PLACED ABOVE THE FLAME.—Put the oil into a bladder or any other flexible vessel, say Leeson's Gas Bottle, (see 459,) and let it be prevented from collapsing by a *helical wire spring*. Above the bag place a disc with a pin in its centre; upon

this disc let ring-formed weights be placed, so as to press up to the wick the quantity of oil required.

539. New Metallic Compound Antimomantico, which resembles gold both in colour and weight.—This Metallic Compound was invented by a gentleman at Leghorn. It is of the same weight as gold of eighteen carats, and can be made like that of twenty-four. The Metal is sold by the inventor, (who keeps his secret,) at two dollars and a half per pound of twelve ounces, which will make nine dozen coat buttons, resembling those highly gilt, the *Antimomantico* is soft and bends, and is superior to other gold-coloured metals in not tarnishing.

540. To cement pure iron, so as to harden, temper, and make it exhibit the properties of steel.—This process is most advantageously applied to articles that are small, such as iron-wire, or wire-gauze; surround the *pure iron* with minutely divided powder of grey coloured cast iron; the powder must be in contact with the iron, and if the whole be covered with sand, oxidation from being in contract with the air, will be avoided, and thus the cast metal may be used several times.

541. Indeliable Writing. –Prepare a saturated solution of Indigo and Madder in boiling water, and let the proportions of each be such as to give a purple tint. To this solution add the sixth part of sulphuric acid; write with this ink, and expose gradually to the heat of the fire, when the writing will be *burnt in* and *charred*, when a little crumpling and rubing of the paper, will reduce the writing to powder; now put a sheet of blackened paper behind, and the writing will be visible.

Note.—The writing will appear as if stamped out of paper.

542. M. Robinet's way to make Patent Seidlitz Powders, from the *Journal de Pharmacie.*—Take of Sulphate of Magnesia, in fine powder, one quarter of an ounce; and of the super-carbonate of soda, one twelfth of an ounce. Mix them carefully and mark it powder, No. 1. Take of tartaric acid forty grains, and having powdered it well, fold it in another paper, and mark it No. 2; and thus genuine Patent Seidlitz Powders may be formed.

543. To prepare Volatile Salt-carbonate of Ammonia.—Take of sal-ammoniac, 8 parts; chalk, 10 parts; and having dried them both well, introduce them into a retort, apply a dull red heat, and the carbonate of ammonia will pass into the receiver, and be condensed. (see 90, 91, 157.)

Note. The carbonic acid leaves the lime of the chalk, (see 61,) and combines with the ammonia of the sal-ammoniac, forming carbonate of ammonia, (see 156, 157;) while the muriatic acid (103) of the sal-ammoniac combines with the lime of the chalk, to form *Muriate of Lime.*

544. EXTEMPORANIOUS JAVELLE BLEACHING LIQUOR.—Put a few grains of chlorate-oxy-muriate of Potasse (149) into a tea-spoonful of muriatic acid (103) and delute it with water, and it will bleach and remove all kinds of spots from linen, (except those of an oily or greasy substance.)

545. TO PREPARE GUNPOWDER, AFTER THE RUSSIAN METHOD.—Mix saltpetre, sulphur, and charcoal dust in the proportions mentioned (204) and boil them in water for two or three hours, till all the water is evaporated, and the composition becomes very thick; then dry it in a flat vessel placed in the sun, or a warm place, and when nearly dry, form it into very small grains, by forcing it through a seive.

546. PROPORTIONS OF NAPIER'S GUNPOWDER.—Nitre, 48 parts; charcoal, from eight and a half, to nine and a half; sulphur, from two and three-fourths, to three and one-fourth.

547. TO PREPARE KEIR'S AQUA REGIS.—Add to a mixture of oil of vitriol and nitre, a saturated solution of common salt in water, and a bright deep yellow regis will be formed suitable to dissolve gold and platinum.

548. KEIR'S AQUA REGINA,—The solvent of the Queen of Metals (silver) is made by pouring 8 or 10 lbs. of oil of vitriol upon one pound of refined saltpetre.

549. TO PRESERVE SKINS FROM PUTREFACTION.—Tyman, a tanner in Hungary, has found that by brushing skins over with pyrolignious acid, (see 271. Part 2d.) they may be preserved from putrefaction, and also recovered when attacked; and are deprived of none of their useful qualities.

550. CHINESE METHOD OF FATTENING FISH.—A pond is made for the purpose and filled with water. Into this pond young *fish* are introduced. They are in this stew fed regularly evening and morning with boiled rice and the blood of animals. Fish, so fed, advance in size rapidly. Drafts from the pond are occasionally made, and carried to the market in large shallow tubs of water, when if sold, well; but, if not, they are brought back and plumped again into the stew, to fatten till next market day.

551. A Method to ascertain or measure the focal distance of a convex glass or Lens--say a lens of a Spy-glass--of a Telescope--or of a Spectacle-glass.--Hold the convex-glass in the rays of the sun, and opposite to a piece of white paper, and move the glass *too and from* the paper till a *white spot* or the *burning point* is formed on the paper: Now measure the distance between the glass and the spot of extreme light, (on the paper) and the distance will be the focus of the glass.

552. To Make a simple Astronomical refracting telescope with only two glasses for viewing celestial object.--Take an object glass (the glass at the end of the telescope, nearest the object to be viewed) of 30 inches focal distance, (see rule No. 551.) and fix it into one end of a tube;--then fix into the other end of that tube another glass, which is called the eye-glass, (because it is that glass which is held next the eye when looking through the telescope at an object) and let its focal distance be one inch, and let the length of the table, or the distance between the eye and object glasses be 31 inches, which is equal to the sum of the focal distances of both glasses, and then an *astronomical refracting telescope* will be formed capable of magnifying from one to thirty times;--that is, objects seen through such a telescope will appear thirty times larger in *diameter*, or thirty times *nearer* than to the naked eye.

Note. With such a telescope, the mountains and valleys and the surface of the moon may be seen, and some of the satellites of Jupiter may be perceived; but terrestrial objects viewed through such a glass, would appear inverted: to remedy which, let a concave eye-glass of one inch focus be placed 29 inches from the object-glass, and the object will appear in its natural position, and its magnifying power will still be the same; but the field of view will be much smaller.

553. Magical Illusions.--Suspend a screen of white transparent cloth from the ceiling, and behind it, place a very powerful light.--If we recede from the screen, our figure will become enlarged to a gigantic stature, and on the contrary, if we approach it, and are between the light and the screen, our figure will be more accurately defined: but by jumping over the light, we shall appear, to persons looking upon the screen, as having ascended to such a great height as entirely to have disappeared. By nimble attitudes, and grotesque movements, and a tasteful introduction of some animals, the effect will be

much heightened, and laughter, which is good for the heart, (*that is sad*) will be excited.

554. To Make Hens Lay Eggs all through the Winter.—Mix powdered oyster-shells and slate with their food.

Note. The lime of the oyster-shells is necessary to form the shells, and the slate improves their quality and flavour.

555. To Breed Poultry in Winter.—Let a house be divided into four apartments; the first for hatching chickens—the second for breeding turkeys—the third for ducks, and the fourth for geese. Have a furnace at one end, with a steam-boiler that will hold 60 gallons, which will heat a house sixty feet in length, the first two apartments must have the steam pipes passing twice round the bottoms of the walls for hatching chicken and turkey eggs—and they must pass once around the other two rooms for hatching ducks and geese, because they require less heat.

556. Contrivance to watch the Swarming of Bees.—(*From the Glasgow Chronicle.*) Place the hive upon a weighing beam, 3 feet 8 inches long, and balance the hive by putting weights in the other scale. When the bees begin to cast, and when the first pound's weight have left the hive, the beam will turn back a little, and the scale will force out a trigger like the pin of a mole trap, which, being connected to the wire of a bell in the house, will warn the bee-mother to go and take care of the swarm.—Mr. Duncan, Gardener, near Ayr, has practised the above method for several years.

557. A French method to Destroy Moles.—Procure a number of worms,—kill them, and add to them powdered nux vomica: let the whole stand 24 hours, then open the mole tracts, and put one, two, or three of these worms in every hole.

556. Of the Achromatic Telescope.—This telescope differs from the common refracting telescope in the object glass being compounded of two, and sometimes of three lenses, instead of one; and all placed close together, when there is only two, one is a double concave *white flint* glass, and thus an image is formed without the prismatic colours. An achromatic telescope, if 4 feet of length, will magnify an object as well as a refracting one 100 feet long.

557. An Easy Method of Cutting Glass.—Surround the glass with a thread previously dipped in sulphur, then set fire to it, and dip it smartly in cold water, and it will be cut the way required.

558. To extract Bee's Wax from Bee-Combs.—Have on the fire a vessel of boiling water, and also standing beside the fire a basin of cold water. Put the comb tied close in a canvass bag into the boiling water, squeeze it repeatedly down with a stick, and the wax will pass through the bag, and swim on the surface of the water. Skim it off, and put it in the vessel of cold water; and thus, by repeated squeezing and skimming, every particle of wax will be obtained. When congealed on the cold water, it may be taken off, again melted, and cast into moulds of any shape.

559. To prepare Lamp Black for use.—Press a portion of it into an earthenware or metallic vessel, and make it red hot in the fire, till it ceases to flame at the exposed parts; take it from the fire, and allow it to get quite cool before you remove it, otherwise it will burn to ashes. Lamp-black thus prepared is fit for printers, varnish-makers, and painters.

560. A French Method to make Transparent Soap.—Put tallow soap, or windsor soap into a thin vessel of glass, half-filled with alkohol, (spirit of wine) and place it near the fire till all is dissolved. Then take it from the fire, and pour it into any kind of fanciful mould to cool, and transparent soap will have been made.

Note. It may be perfumed with a few drops of any essential perfumed oil.

561. To prepare an Indeliable Marking Ink.—Dissolve one ounce and a half of soda with the same quantity of gum arabic into four ounces of water, and moisten the linen to be marked with it; when the linen is dry, rub it with the edge of the bottom of a bottle to polish it. Then dissolve 50 grains of nitrate of silver, (silver dissolved in nitric acid) 50 grains of lamp black, and the one eighth of an ounce of gum arabic in one ounce of water, and write with the mixture, and the writing will resist every effort to remove it.

562. A French Physician's prescription to diminish a propensity to Drunkenness.—Take a quarter of a pint of water three times a-day, in which 10 drops of diluted sulphuric acid (oil of vitriol) has been mixed, and in a short time it will produce a disgust to the most favourite liquor.

Note. If this prescription answer the purpose intended, it must be the most valuable piece of information contained in the Experimentalist; at any rate, if, upon trial, it should be found ineffectual, it will, at least, do no harm.

563. PREPARATIONS TO DESTROY MOTHS, AND PRESERVE THE SKINS OF BIRDS AND ANIMALS FOR STUFFING.—Make a weak solution of the oxy-muriate of mercury, in the spirit of rosemary, (about forty grains to the pint,) or a weak solution of the arseniate of potass, in the same spirit (about 15 grains to a pint) and sprinkle or anoint with either liquid.

564. *To preserve Bacon, and other Meats in summer.*—Mix together one pound of common salt, one ounce of nitre, and to this mixture add a tea-spoonful of a mixture of the nitric and muriatic acids, (see 155, 186, and 103, 395,) mixed in equal proportions. This mixture will preserve it in the hottest days of summer as well as if it had been salted in the coldest days of winter; and farther, if it be required to give it a smokey flavour, a dessert spoonful of the impure pyrolgneious acid may be added to the above quantity of materials.

565. *An American Shoe Blacking.*—Take of plaster of paris, ground and sifted, 2 lb. 4 oz.; lamp-black, 9 oz; barley malt as used by brewers, 18 oz; olive oil. 1 oz. Steep the malt in water almost boiling hot, till the soluble portions are extracted; then stir into it the plaster and lamp-black, and evaporate to a paste, then add the oil. This blacking may be perfumed, and, says the American, it is undoubtedly the cheapest and finest blacking, spreading evenly, drying and shining quickly on the leather, by a slight friction of the brush, and also does not burn the leather.

566. *Preparation for etching or biting on very soft steel.*—Mix together 3 oz. of water, 4 grains of tartaric acid, four drops of nitric or sulphuric acid, and six grains of corrosive sublimate.

567. *Mr. W. Humphrey's Menstruum for etching on soft steel plates.*—Dissolve in half-a-pint of hot water, one ounce of powdered alum, and one quarter of an ounce of powdered corrosive sublimate, and let it cool before use.

568. *Directions for using the Etching Menstruums,* 566, 567.—Having laid on the ground, and having your menstruum cool, pour it on the plate, and keep stirring it with a camel's hair brush, and take care to wash the plate carefully after each biting.

Note.—Delicate tints are obtained in about three minutes. This art has been brought to great perfection by Mr. Scott, engraver in this city, specimens of whose work may be seen in Gullan's Picturesque Views in Glasgow; also in the portrait which accompanies the first part of this work. It is really surprising, (considering the resemblance of the *print* to a drawing in Indian Ink, the cheapness of the execution, the amazing quantity (50,000) that a plate will throw off,) that so few in this city have their *portraits* done in this manner, when they have so able an artist at hand.

569. *To Determine the action of the Galvanic Pile upon the different Parts of the Brain.*—Saw off a part of the cranium (or scull) as seen in the heads of the OX and CALF, (*see Fig.* 446. *Lithographic Plate* 1*st.*) and complete the circle between the bottom of the Pile and the ears of each head, also let the top of the Pile be connected with either of the brains, according to their different anatomical dissections, and all at once the two heads will exhibit very lively muscular convulsions,—all parts of the brain are obedient to the force of Galvanism; but the white medullary part, joining the two hemispheres of the brain, (called the corpus callosum) and the posterior part of the brain (called the cerebellum,) give the most lively demonstrations of Galvanic activity.

The Readers of the Experimentalist are requested to reflect closely on the results of the Galvanic experiments,—as much light may thereby be thrown on his future studies of that science which developes the laws which govern animal life.

570. *To Prepare Isinglass Wafers.*—Let isinglass dissolved in water, and evaporated to a proper thickness, by means of the portable evaporator, (486) be poured out upon plates of glass provided with borders, and to prevent the isinglass glue from sticking to the plates, rub a little ox-gall over them before the thin scale of isinglass becomes quite dry, separate it from the edges, and in about 24 hours (when they are quite dry,) lay a number of sheets over each other, (say 50) and with a hollow punch, such as a lozenge cutter, cut them out 50 at a stroke.

Note. While isinglass is in a fluid state, any of the various coloured pigments may be added, or any perfume, and thus you may have beautiful perfumed variegated wafers for sealing letters with, which are far more secure than paste wafers.

Correspondents will be attended to next Number.—T. M. Gorbals is received, and will be attended to.

Plate IInd,
to face Page 121 of the
Chemical Experimentalist

Fig 2.

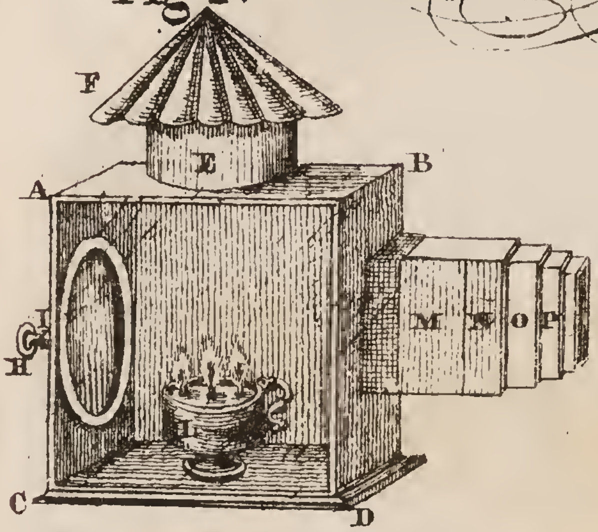


Fig 1.

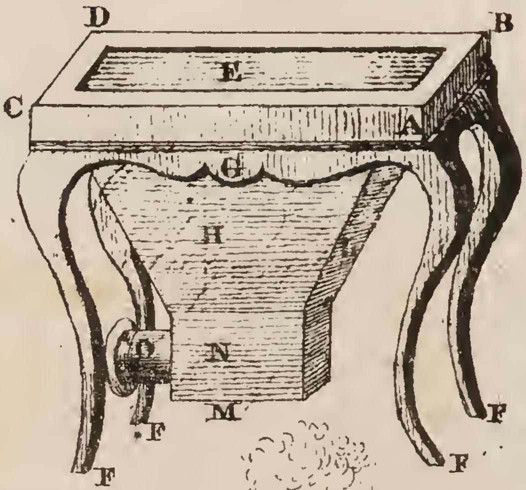


Fig 4.

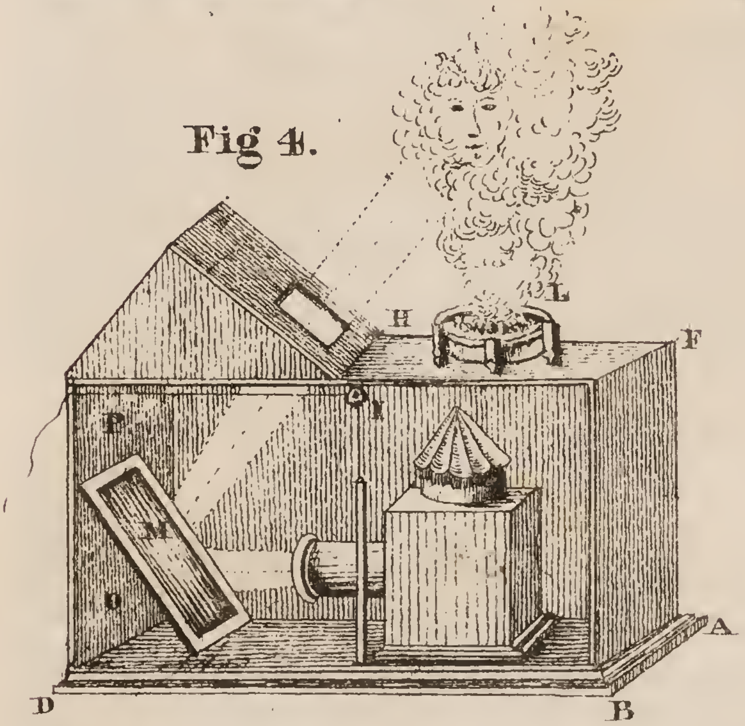


Fig 3

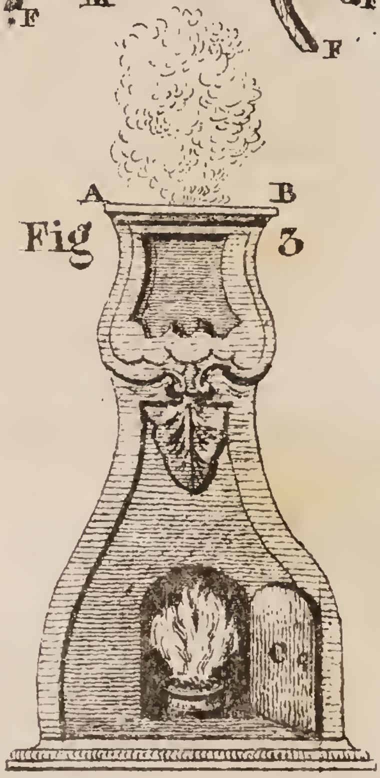


Fig 9.

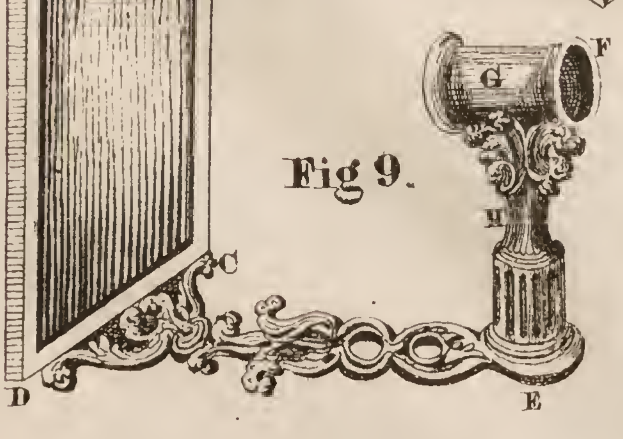


Fig 8.

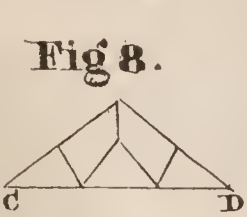


Fig 7.

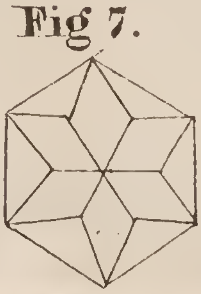


Fig 6.

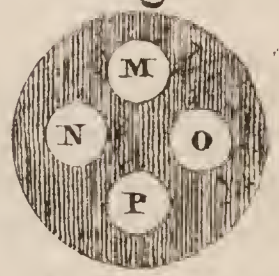
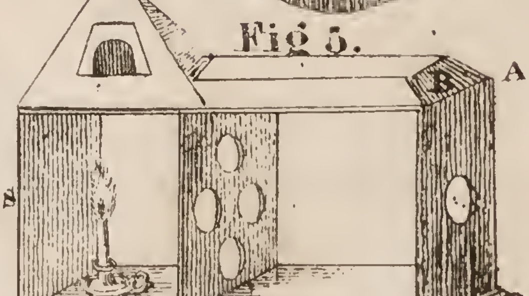


Fig 5.



Stuart's Useful Information for the People, No. 27,

Being No. 16, of the

CHEMICAL EXPERIMENTALIST.

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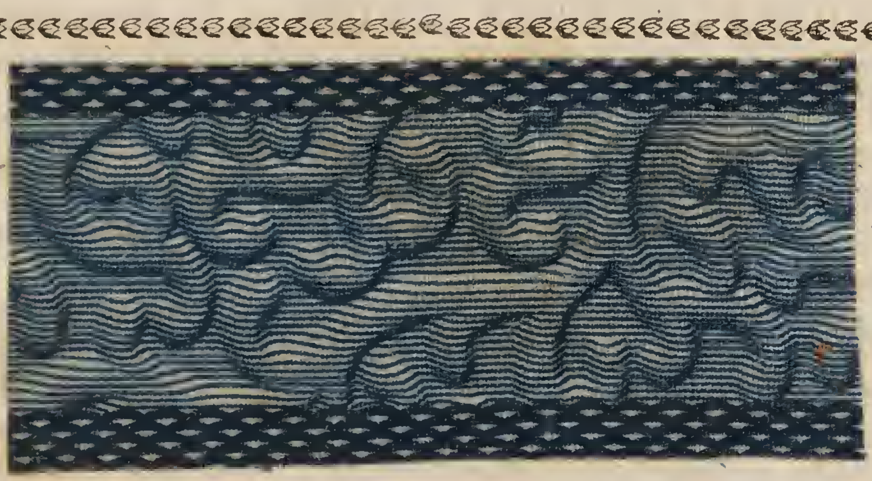
571. To Dye Prussian Blue.



572. OF MORDANTS.—Mordants are substances which possess a chemical affinity for the cloth to be dyed; whilst, at the same time, they have another affinity when combined with the cloth, to unite with a third substance, (which, again, in the chemical way of speaking, is said to have an affinity for the mordant). This third substance is, in general, the colouring matter; and, being combined with the mordant and cloth, forms what is said to be fast colour; that is to say, the substances are fast in the cloth, whether the colour fade or not.

573. OF FAST COLOURS.—In order that colours be durable, and not fugitive, it is necessary that the *dye-stuffs* by which they are produced, should be of as unchangeable a nature as possible, for it is not only necessary that the colouring substance should be fixed on the cloth by means of a mordant, but that the substances themselves, shall not be changed by soap or light, and that it may be kept clean, it must stand the *test* of soap in being washed.

574. Nitrate of Iron, a Mordant for Prussian Blue.—Take of nitric acid, (155, 186), and put into it some old iron hoops, or else clean iron turnings, and let it stand for a little time, and the iron will be dissolved by the acid, and shall remain in solution; this solution is called the nitrate of iron, and it is a mordant for prussian blue.

Note. If the nitrate of iron be wanted immediately, it may be prepared quickly by applying a little heat to the vessel containing the iron and acid.

575. Another Mordant for Prussian Blue, which is commonly known in the trade by the name of Iron Liquor.—Take of the acid spirit of wood, (pyroligneous acid, 271), and let iron filings or turnings be submitted to its action in a wooden cistern, and the wood acid will dissolve the iron, and form what has been by chemists called, the the acetate of iron, or the metallic oxide of iron in the state of the acetated protoxide. This mordant, when applied to the cloth, in a few days gives up its acid, and takes in another dose of oxygen from the atmosphere, forming the per-oxide of iron.

576. **TO PREPARE LIME WATER.**—To prepare the solution of lime, (lime water,) slake lime to a thin paste, afterwards add a sufficient quantity of water; stir the mixture repeatedly, then let it stand to settle, decant the clear liquor, and preserve it in closely stopped vessels, (for the reasons see 54), lime is more soluble in cold than hot water, at 60° Fahrenheit, only about one grain is dissolved in 752 of water.

577. **FERRO-CYANATE OF POTASSA,** *formerly called the triple prussiate and ferro-prussiate of potassa; known in commerce by the name of the "prussiate of potash."*—This salt is transparent, and crystallizes in fine large amber yellow coloured crystals, and is free from taste or smell. Water at 60° Fahrenheit dissolves nearly one-third of its weight, and boiling water nearly its own weight; its solution is not precipitated by alkalies, or by alkaline salts, but is decomposed by some of the earthy, and almost the whole of the metallic.

578. **TO DYE PRUSSIAN BLUE,** *(see pattern 571.)*—Having a clean white piece of calico or silk ribbon, free from starch or gum; provide yourself with three basins, or other convenient vessels, according to the quantity of stuff to be dyed; into one put *cold water,* into another a solution of the ferro-cyanate of potassa, (577,) and into the third, nitrate of iron, (574). Immerse the cloth to be dyed into the basin containing the nitrate of iron, and let it remain therein for some time, then take it out of this basin, and rinse it in that containing the cold water; lastly, dip it in the basin containing the ferro-cyanate of potassa, and it will be dyed blue.

579. To fix Prussian Blue Dye on the Cloth.—Into the basin containing the ferro-cyanate of potassa, (see 578), put as much sulphuric acid (oil of vitriol) as shall make it sharply acid, and before putting in the cloth dyed, as in last experiment to be *fixed,* stir and mix it well, lest from the acid being unmixed, and lying at the bottom, it should burn the cloth, of which there is no danger, if the whole be well mixed before the cloth be put in. Now put in your cloth, and it may be withdrawn immediately of a permanent blue dye; and has only to be well washed to be complete.

Note. The more perfect the washing, the brighter the colour of the dye. How to discharge prussian blue dye, will be shown in a succeeding article, (622).

580. To prepare that valuable pigment Prussian Green.—Let two parts of carbonate of potash with three parts of dried blood, be ignited together; let a lixivium (solution by water) of this be made by repeated effusions of water, add to this lixivium a solution of one part of sulphate of iron, (see 8), and two of alum, when a beautiful green precipitate will fall down, which is **PRUSSIAN GREEN.**

581. TO PREPARE PRUSSIAN BLUE.—Take of the beautiful *Prussian Green* formed in last experiment, (580), and wash it with diuted muriatic acid, (see 163), when it will assume a beautiful blue colour.

582. To prepare Black Beer, equal to Dantzic.—Take 12 bottles of the best London porter, one pound of treacle, and one pound and a half of the best Italian juice—burn a little of the treacle, and dissolve the Italian juice in a little porter; mix all together in an old black beer cask, into which put one ounce of laudanum, and 4 gills of gin, bung up, and let it remain in a cool place for 3 months, when a good black beer will be found fit for use.

Note. As much must be made at once as will fill the cask.

583. TO MAKE HATS WATERPROOF.—Grind shell-lac in a coffee or pepper mill to a fine powder, then put it into a box with a seive like a pepper box; dust from this box some of this powdered shell-lac upon the skeleton of the hat while on the mould, then with a hot hatters' iron pass quickly over the hat, when the lac will be dissolved, and spread into the texture of the stuff, and thus shall the hat be rendered waterproof.

584. To case-harden Steel in a minute.—Heat the steel required to be case-hardened, to a proper heat, then rub upon it some prussiate of potash, (577), and dip it quickly in water.

585. TO MAKE A UNIVERSAL MAGNET, *or a Magnetic Needle that shall point to* ANY POINT *in the compass, or that will always stand due East and West.*—Take a thin flat piece of steel, and lay it right over the needle standing North and South in a common compass. Then magnetize it the contrary way or across the needle, and when supported and at liberty on a pivot it will stand East and West.

586. *To the Editor of the Chemical Experimentalist.*—Sir,—The mingled feelings of delight and admiration with which I have perused your modest titled, though excellent works, have at last prompted me thus to address you:—In lending my feeble mite to your valuable and justly-praised efforts, permit me, then to submit the following articles to your perusal, and if you find them of any use you are welcome to give them to the world; if such is the case, I have a great many more past me, the whole of which is at your disposal—I remain, &c. Thomas M'Cune.

587. POTATOE CHEESE.—Take the best potatoes and boil them; when cold, beat them into a pulp, adding a pint of sour milk to 5 lbs. of potatoes. Keep the mass covered for three or four days, and then beat it again. Make it into small cheeses, which are to be placed in baskets, to let the superfluous moisture escape. Dry them in the shade, and pile them on each other for fifteen days, after which they may be put in any manner in a dry place; they have a very pleasant flavour, and will keep good for years, improving with age. Cheese thus made, is in common use in most parts of Saxony.

588. MILK.—M. Kirchoff, the Russian chemist, has discovered a mode of keeping milk for an indefinite length of time, by the following process: He causes new milk to be evaporated over a very slow fire, until it is reduced to a dry powder. This powder is then put into a bottle hermetically sealed. When the milk is wanted for use, it is only required to dissolve some of the powders in a reasonable quantity of water, and the mixture so dissolved will have all the qualities, as well as the taste of milk.

The Editor respectfully acquaints Mr. M'Cune that the above receipts would have been introduced into the EXPERIMENTALIST sooner, had they not dropt aside in the publishers, the other articles promised will be made welcome as early as convenient.

589. FRENCH POLISH.—To one pint of spirits of wine, add half an ounce of gum shell-lac, half an ounce of gum-lac, and half an ounce of gum sandarac. Place the whole over a gentle heat, frequently agitating it, till the gums are dissolved. Then make a roller of list, put a little of the mixture in it, and cover that with a soft linen rag, which must be slightly touched with cold-drawn linseed oil. Rub them into the wood in a circular direction, covering only a small space at a time, till the pores of the wood are filled up. After this, rub in the same manner spirits of wine with a small portion of the polish added to it, and the effect will be complete. If the furniture had been previously polished, it must first be cleaned off with glass paper.

Note. I have given two receipts for French Polish already (206, 291), but I consider it also my duty to give 589, as thereby the workman may be enabled to select the best, or perhaps make a better than either from amongst the three.

590. TO MAKE CAST METAL PIPES, WHICH LEAK, WATERPROOF WITHOUT RE-CASTING.—It is a common practice in one of the largest cast-iron Founderies in Scotland, to prove the vessels or cylinders, made there, before the persons who order them, by forcing water into them by means of a Bramah water-press; if it leak, they at once state that they will cast a new one: Now, all that is done, is merely to charge the water-press with a saturated solution of

Sal-ammoniac in water, which has the property of shutting up all the pores, and thus the leaky metal vessel, or tube, becomes water light.

591. Dr. HOPE'S LECTURE ON TIN AND LEAD, *at Edinburgh, March* 18, 1829.—Take any of the Hydro-sulphuretts, (see 46, 47, 49), and mix them with water; then write upon paper with acetate of lead; and after the paper is dry, the writing will be invisible; but draw it through a sulphuretted solution, and it will become instantly black.

592. To Raise the Colour of Brazil Wood, *Continuation of the above Lecture.*—Take 4 lbs. of Brazil Wood, and boil it in four pints of water, till it shall be reduced to 16 ounces, then add a little muriatic acid, (see 103), when the fluid will become red; now add some muriate of tin, and the red will become brilliant. A little gum and sugar added makes superior red ink.

593. To Prepare the Chemical Metallic Tree of Diana.—Dissolve one part of the Sugar of Lead into 14 parts of water, and suspend into it a piece of clean zinc roughened like a rasp, and let it stand over night, and in the morning a beautiful tree with metallic foilage will be the result.

594. TO PREPARE JUJUBES.—To half a pound of lump-sugar, add 1 lb. gum arabic, and a very small quantity of water, lay these substances on the top of the *Portable Evaporator* (486) and set the steam a going, and in a short time they will dissolve, and when evaporated till enough, let the sheet be cut with scissors into small squares, and thus jujubes are formed.

Note. A little burnt sugar—brandy-colouring—(475) a little cochineal or saffron may be added to colour, as they may be wanted Brown—Red—or Yellow; also, a few drops bergamotte,—lemon, or otto of roses, will flavour.

595. Description of the Portable Evaporator, (486).—The *cut* is so plain and simple, it will readily be understood by a very short description: *g* is the ash-pit, *f* is the stove door, or entrance to the fire place, *d* is the stove, *c* is the boiler for raising the steam, *b* is a tin box for containing the steam, *a* is the top of that box with an edge round it for containing the substances to be evaporated,—*i* is a pipe in the tin box for letting off the water of the condensed steam, *h* is the chimney.

596. TO PREPARE HATTER'S VARNISH.—Dissolve one pound and a half rosin into one gallon of turpentine, and you will have the varnish used by Hatters.

Note. They increase and diminish the quantity of Rosin, to suit the strength they require the varnish.

597. Receipt No. 1. IN SUGAR-BOILING.—*To boil Sugar to what is called by Sugar-boilers and Confectioners,—the caramel height.*—Having dissolved your Sugar in water, boil it on the fire, till when a piece of wood, or clean pipe shank dipt in it, and afterwards in cold water may allow a piece of sugar to be drawn from it, and broken like glass.

Note. This is the height to which barley-sugar,—Nelson's balls,—and all kinds of *rocks* (see 620) are boiled—a little more boiling burns the sugar.

598. OF THE MAGIC LANTERN.—This ingenious invention, now known all over the world, and become common in all countries, caused much astonishment at its discovery;—by means of it, we can amuse ourselves again and again with much pleasure, its effects are best represented upon a white linen cloth extended in a *dark place.* The objects represented are painted in transparent colours on plate glass.

599. CONSTRUCTION OF THE MAGIC LANTERN.—A, B, C, D, is of white-iron, (Figure 2nd, Plate 2nd), and is ordinarily made 7 or 8 inches in height: 6 in length, and 5 in breadth. On the top is a chimney, E, covered with a dome, F, which gives passage to the smoke, while at the time it keeps the light from being spread in the chamber. On the side, A, C, of that box or tin-case, is a door which opens outwards, upon which is adjusted a concave metal mirror, G, (we can make that mirror of copper silvered, or even one of those used for reflecting the light of a lamp; or still more simply, white iron well beat and polished,) being five inches in diameter, and let it be part of a sphere of one foot and a half diameter; that mirror ought to have fixed behind at its centre a handle, H, which enters into a socket, I, soldered to the middle of that door, in order that we can advance or draw back the mirror as we shall find necessary.

In the middle and interior part of the bottom of the lantern is placed a lamp of white iron, L, (that lamp ought to be moveable, in order that we may be able to remove it to or from the mirror,) in which the hole for the wick must be flattened, so that it may not obstruct any of the rays of light returning from the mirror towards the side, B, D; and it should contain two or three of these holes, for separate wicks, and the centre of the light should be in the same line as the centre of the mirror, and glass on the other side.

In the side, B, D, of the lantern, which faces the mirror, is an opening of three and a half inches of breadth, and two and a half in height; and in the front of it is soldered a piece of white-iron, with a groove, M, for the purpose of running through strips of painted glass: that same piece contains a tube, N, having the form of a long square, (I prefer giving it this form, in order that the image upon the screen may have the appearance of a picture), into which, let other two tubes, O and P, be adjusted five inches in length. These tubes enter the one into the other. We now fix at the extremity of the tube P a convex lens of three inches in length, by two and a half in breadth, and having three inches of focus, and at the extremity of the tube P, another glass of the same form, and of from five to six inches of focus, and we put at the other extremity of the same tube, a partition of card, perforated with an oblong hole. These two tubes serve to arrange the glasses so as to produce the image required on the screen.

600. Laws of Vegetation.—In ascending above the level of the sea, vegetation is modified in its gradations, in the same manner as if we were to remove from the line to either pole; in short, the ascent of 5 or 6000 yards, in the hottest parts of the globe, produce changes in vegetation and temperature, as distinct, as removing 6 or 7000 miles from the equator towards the *Polar Regions*, with this difference, that in removing from the equator towards the poles, the phenomena *of change* succeed almost by imperceptible degrees; whereas on ascending mountains, these phenomena crowd upon and follow each other in rapid succession.

601. Extreme Coldness of the Moon.—It is a fact, that the higher we ascend, the upper stratum of our air becomes shallower; and of course, both lighter and thinner,—from this proceeds the excessive cold (or deficiency of sensible heat) at great heights; and as it is the action of the atmosphere upon the rays of light, to decompose them, and eliminate their heat, which previous to their penetrating it, were latent—fixed—or insensible; it follows, that if the moon be devoid of an atmosphere, she must (so far as the same laws that govern us, are concerned) be in an extreme state of cold.

602. Of Light and Heat.—It is the action of our atmosphere upon the rays of light, that extracts the caloric (heat) from them—and we know that the extraction of heat diminishes in proportion as the mass of air, traversed by the rays, is shallower; but on the other hand, the light is more active and pure.

603. Statistics of Smoking.—The propensity of smoking is declared by the physicians to be actually one of the most efficient causes of the German tendency to diseases of the lungs. In point of expense, its waste is enormous. In Hamburgh alone 50,000 boxes of cigars have been consumed in a year; each box costing about three pounds sterling; £150,000 pounds puffed into the air! And it is to be remembered, that even this is but a part of the expense; the cigar adorning the lip only of the better order, and even among these, only of the young; the mature generally abjuring this small vanity, and blowing away with the mighty meerschaum of their ancestors.

604. To prepare Bird Lime.—Stuff prepared after different ways; the common method is to peel a good quantity of holly bark

about Midsummer, fill a vessel with it, put spring water to it; boil it till the grey and white bark arise from the green, which will require twelve hours boiling; then take it off the fire, drain the water well from it, separate the barks, lay the green bark on the ground in some cool cellar, covered with any green rank weeds, such as *dock thistles, hemlock. &c.* to a good thickness; let it lie so fourteen days, by which time it will be a perfect mucilage; then pound it well in a stone mortar till it becomes a tough paste, and that none of the bark be discernible; next after wash it well in some running stream, as long as you perceive the least motes in it; then put it into an earthen pot to ferment, scum it four or five days, as often as any thing rises, and when no more comes change it into a fresh earthen vessel, and preserve it for use in this manner. Take what quantity you think fit, put it into an earthen pipkin, add a third parts of capons or goose grease to it, well clarified, or oil of walnuts, which is better, incorporate them on a gentle fire, and stir it continually till it is cold, and thus it is finished.

To prevent frost; take a quarter of as much oil of *Petroleum* as you do goose grease, and no cold will congeal it.

605. HOW TO USE BIRD-LIME.—When your lime is cold, take your rods and warm them a little over the fire; then take your lime and wind it about the top of your rods, then draw your rods asunder one from another, and close them again, continually plying and working them together, till by smearing one from another, you have equally bestowed on each rod a sufficient proportion of lime.

If you lime any strings, do it when the lime is hot and at the thinnest, besmearing the strings on all sides by folding them together, and unfolding them again.

If you lime straws, it must be done likewise when the lime is very hot, doing a great quantity together, as many as you can well grasp in your hand, tossing and working them before the fire till they are all besmeared, every straw having its due proportion of lime; having so done, put them up in cases of leather till you have occasion to use them.

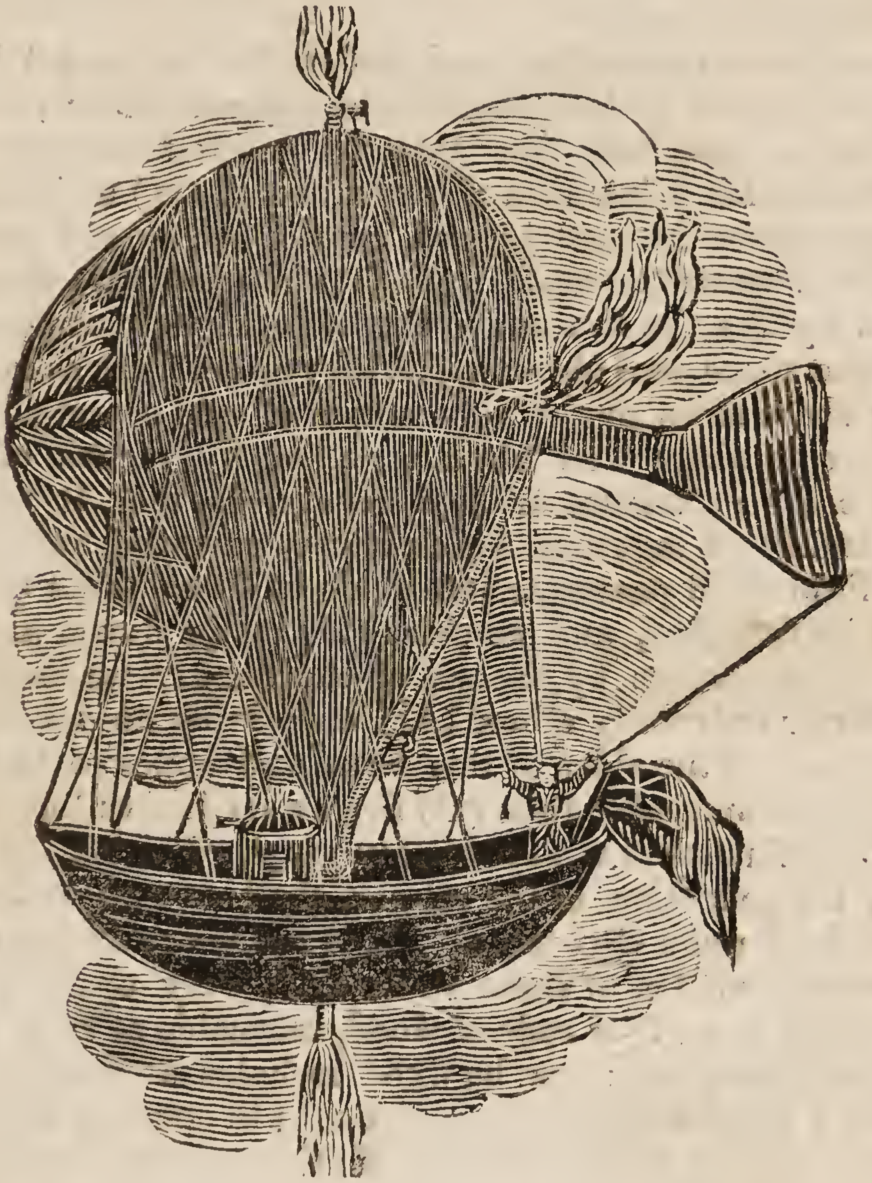
NOTICE TO CORRESPONDENTS.—"R. M'K," Kilmarnock, silvering Brass Trumpet Mouth-pieces and Anderson's Pills will be attended to. "*A Constant Reader*" will perceive I have made up a good deal of my *lea-way* in this number. "A. C. R." it is hoped will be satisfied for the present. "T. M." may expect an article on crucibles in an early number. "B. W. M." Greenock, is informed that the agents for this work continue the same as formerly; also, that the publication will appear regularly every second week, whether *advertised* or not. My friend's friendly advice from Greenock will not be lost sight of.

Stuart's Useful Information for the People, No. 29,

Being No. 17, of the

CHEMICAL EXPERIMENTALIST.

606, STEAM BALLOON.



607. PORTABLE CAMERA OBSCURA.—The marvellous effects produced by means of a lens and a reflector in a dark chamber, has been the source of a very useful and amusing invention, *the Portable Camera Obscura*, (see figure 1st, plate 2nd, facing page 121). This useful construction or instrument is of a portable form, and is at the same time convenient for being placed on the ground, in order that the artist may be able to draw or sketch the most agreeable or picturesque views. I shall not here enter into a detail

of the different manners of constructing these ingenious contrivances, so useful to the young painter and amateur; but from among them I shall content myself by describing *one* which is assuredly among the most ingenious, and which in many respects possesses superior advantages; the figure and its description I have taken from the French of "*M. Guyot, de la Societé, literaire et militaire de Becançon.*"—TOME SECOND.

Let A, B, C, D, (Fig. 1st, plate 2nd,) represent a wooden frame, or table of two feet in length, by 20 inches of breadth, and of which the four sides may be made from wood two inches and a half square, and let the four sides be firmly joined together at the angles, having a groove all round the inside of the chassel frame for placing a plate of glass therein, (see E.)

At the two extremities, and under the table, let four feet of wood (F) be fixed by hinges from the traverse pieces, (G) and dispose them so as that they may be easily folded up under the table. Again, have four thin pieces of wood, (H) which ought to be well fitted, moveable aad hinged on the lower and inside of the frame which forms the table, in such a manner that they also may be folded up like the feet under the table, so as to occupy the smallest possible space, and observe that they be set forth as in the design, fig. 1st; these sides ought to be made of well seasoned wood, and the corner joinings well fitted together by means of a number of small brass crotchets, or *hook-snecks*, so that it may be well framed and fitted together, which is very essential, as it is necessary that no light shall penetrate into the box. That table being mounted upon its four feet, and its sides (H) being down, and fixed together at the corners by means of the *hooks;* we next adjust to their inferior extremity a box (M) containing an *inclined* mirror, and from one of the sides of this box, and opposite to the mirror, should pass a moveable tube (O) five or six inches long; that tube ought to be furnished with a convex glass, of which the focus, (see 551,) by the reflection of the mirror, shall extend to the glass (E) which is fixed upon that table. It is necessary to have also a species of small pavilion of some black stuff, very opaque, which can be supported upon four rods of wood, moveable at their upper parts, and whose lower ends can be fixed in holes at the four corners of the frame; this pavilion or canopy ought to open on that side which is turned towards A. B. and again it (this opening) ought to be shut by a veil or curtain large enough to shut out the external light from falling in any manner upon the glass upon the table; when we design under this pavilion, it ought to be shut on all sides for some inches below the table.

608. *The manner of using the Camera Obscura,* (607) *for designing all sorts of objects.*—The beauties or excellencies of this Camera Obscura, cousist in its portability, in its being arranged, so that the coloured rays of light reflected from objects, paint themselves upon the lower side of the glass forming the top of that table;

by that means we are enabled to design, without having the hand between the rays and the image. In using the *Camera,* we place the table upon the ground, a little elevated, in order that nothing may intercept the rays of light which should fall upon the glass, placed at the bottom of the box which is attached under the table; we put upon the glass E (fig. 1st) a sheet of transparent varnished paper, and we fix it by its extremities with a little wax, in order that it may not be readily deranged; we next shut ourselves under the curtain or canopy which covers the table, and trace upon the paper all the *contours* and outlines of the objects which are represented thereon; we shall also be able to mark the shadows, but if we are not able to make out the finer lineaments of the objects, we must provide ourselves with a glass, softened by grinding, (on the upper side which forms the top of the table), and trace upon this obscured glass, with a pencil of carmine, we then soak a sheet of paper *spring* in water, and when it has imbibed sufficient, nevertheless, without being too soft, we now spread it out upon the glass gently, and we shall obtain by that means an impression of the design which we had before traced.

609. SOMETHING NEW—*A Balloon Steam Boat.*—My readers, the name I have adopted for this *Ærostal Steam Vessel,* will no doubt sound something new in your ears, but although it is new, it is no less likely to be true, that upon the principles which I have designed it to be constructed, it shall not only make voyages through the air, but it may be directed and guided by its helm, and propelled by steam to any assigned place, superior to any vessel on water. We are well aware that many voyages have been made by aeronauts through the air, therefore it is proven that air has resistance and bouyancy sufficient to carry both a vessel and its cargo; and the only reason I can assign for man's deficiency, and want of success in his experiments in the act of *flying* or sailing in the air, to have arisen from his dogmatical attempts to imitate birds and flys, &c. It is plain, if we wish to make progressive motion through any medium in which we may be immersed, it is necessary that we shall have a power within ourselves to throw out at pleasure, to act upon resisting elements that surround us. When a balloon ascends to a height where its power of resistance on all sides and the air shall be equal; therefore any change that shall disturb that equality of resistance, must of course cause a motion of the balloon to balance the disturbance. Now, it will easily be seen that in my contrivance, (where all friction of machinery is entirely avoided), of propelling the balloon by steam, I have gained a power that may be applied with equal success, either to make her advance, ascend or descend at pleasure. Some may laugh and say my invention is all a *chimera;* but I beg such, if any such there should be, to reflect a little, and they shall, upon second thoughts, perceive that it is not so chimerical as at first they were so apt to think. Reader, hast thou ever seen a rocket *dash* off, darting upwards towards the

heavens, then hast thou seen a parallel illustration of the mode in which I mean my power (steam) to act. Reader, wert thou or I to fix a rocket to any part of a balloon, and set fire to it, would it not propel the balloon forwards after the same manner as it goes itself? it would; but it would be retarded in its velocity, in proportion to the resistance of the air against the HUGE machine which it has now to propel before it; and if, in a balloon like 606, the rudder or helm was set in the smallest degree aside of the line of motion, a counter-resistance would thus be given to the balloon's motion, therefore the balloon would *tack* or sail in a line compounded of the diagonal of the two resistances.

610. Description of the Balloon Steam-Boat. (606)—This steam-boat is so simple in its contrivance, that I have dispensed with figures of reference altogether. First, we have the body of the balloon pear-shaped, which every body will know without further reference; then on the right is seen the rudder or helm, with the helmsman in the boat steering; on the left is seen her *bows*, which wedge-like cleave the air, and which is also moveable at the will of the *helmsman*; but in case the vessel were so huge as to be ranked as a BALLOON STEAM-SHIP! then the *bows* would be managed by a *Bowsman.* On the lower part is seen the boat with the *steam-boiler* resting on its bottom on the left of the pear-like-point of the balloon; from the top of the balloon, the steam may be seen issuing with great velocity; it would thus appear in the act of the Captain making descent; from the bottom of the boat another jet of steam is issuing, this is the state of ascent, and from each side of the rudder, on the right of the balloon, is seen issuing a jet, this is the sailing power; but it remains to be remarked that for the sake of illustration, I have allowed (in the engraving) all the steam jets to be open at once, which is not meant to be the case when she is in active service. When she is sailing forwards, then the *helm-blowers* are open, and all the others remain shut; when she is required to ascend, then the helm-blowers are shut, and the *keel-blower* is opened; and if she is meant to descend, then the *sky-blower* is opened, and the *helm* and *keel*-blowers are shut.

Note. There is a zone surrounds the *waist* of the balloon, to which the *boat*, helm, and bows are fixed, and the steam requires only to be carried by tubes to its respective places of intended action, when merely by the turning of a stop-cock, the balloon will take the required motion. I have many more improvements and discoveries to make known respecting the utility and practicability of *aërial steam navigation*, but I must reserve them for a future part of this work.

611. TO CURE THE MANGE IN CATTLE.—Take a worsted thread and smear it well with strong mercurial ointment, and tie it round the diseased animals neck, and let it remain there, and the disease will to a certainty disappear. The author is certain of the good effects of this remedy, with respect to cows.

612. COMPRESSED PEATS AS FUEL—HOW TO PREPARE PEATS IN WINTER.—This valuable discovery has not yet received that general attention its importance would seem to merit. I have been informed that an ordinary sized peat, when put into a mould and compressed by a powerful lever, would not be larger than an ordinary sized snuff-box. Another advantage attending the manufacture of peats by compression is from the *peat-mould* being full of holes all round; by the great compression, the water is entirely expelled; and thus peat may be prepared at any season. In this compressed state a whole peat stack as now prepared, might, (had it been prepared by compression), be brought to market in an ordinary cart.

613. HOW TO SEAL A LOVE-LETTER WITH WAX, SO THAT IT CANNOT BE OPENED.—This is a very useful article, and it is very simple. When we would seal a letter with wax, so that it might not be opened without discovery, all that is required is merely to *wax* the letter as usual, then before the wax is cold, lay on it, across the edge of the paper, a small narrow stripe of silk, and immediately drop more wax over all, and apply the stamp, and if the wax is good, it will be impossible to open it without discovery.

614. TO CONVERT BLACK TEA INTO GREEN, (WO-PING) AS PRACTISED BY THE HONG MERCHANTS.—Stir the Black Tea on iron-plates moderately heated, and mix up with a compound of turmeric-indigo and white-lead. To give it the fine bloom, it is mixed with the leaves of damson plumbs.

615. HOW TO RESTORE WRITING THAT HAS BEEN WROTE WITH A BLACK LEAD PENCIL, AND HAS BEEN PARTIALLY OBLITERATED.—Anoint the part supposed to have been wrote upon with a solution of the ferro-cyanate of potassa, (see 577), and the writing will become legible.

616. *To Silver a Brass Trumpet Mouth-piece, which process will suit to silver any other brass or copper vessel, in answer to R. M. K. Kilmarnock.*—Cleanse the metal or mouth-piece with aqua-fortis (see 186), by washing it gently and then washing it in water, or by scouring it with salt and tartar with a wire-brush; next, dissolve a sixpence in some more aquafortis, and put pieces of copper into the solution, and the silver will be thrown down in the state of a metallic powder. Take 15 or 20 grains of this silver powder, and mix it with two drachms of tartar, and as much muriate of soda, (see 101) and with a drachm of alum; rub the mouth-piece (or any other article) half this compound till it is perfectly white, then brush it off and polish with leather; another method will be seen under article 700.

617. *The best material for making crucibles for melting crystal, in answer to T. M*—Take of sulphate of barytes, and let it be pounded and made into a paste, with gum adracanth; shape it to the form and size of the crucible you want, and then expose it to an intense fire.—Retrospect of Philosophical Discoveries, vol. 1st, p. 50.

618. TO MAKE THE HAIR BLACK.—Take the berries of an elder-tree, boil them in wine, and wash the head with the juice, it will turn the hair black. Combing the hair with a black-lead comb will also make the hair black, but then it comes off on the linen prodigiously.

619. Receipt 1st—ON GILDING AND SILVERING—*To prepare the wood or frame for Gold or Silver size—To overlay wood with gold or silver.*—To prepare the work, you must be furnished with parchment size, that is, the cuttings of parchment boiled in fair water to a jelly, and when strained and cooled, it will prove a strong size.

When you are to use it, put as much as you shall want in an earthen pot, and make it hot; then, as it is cooling, scrape as much whiting into it as will colour it; mix them well with a clean brush, and with this mixture whiten your wood or frame, that it may the better enter into the hollowness of carved work, then give it rest that it may dry.

This done, melt the size again, and put in more whiting to render it some degrees thicker; and with this do over the frames seven or eight times, or as you see there is necessity; and when it is dry, open with a gouge, not larger than a wheaten straw, the veins in the carved work that the whiting has stopped up, then with a thin wet rag and your finger, carefully smooth and water-plane it over, and brush it smooth when dry, if necessity requires it; and in this condition it will receive your gold or silver size.

620. Recipt, No. 9. ON SUGAR BOILING—*To make black rock clean and good at sixpence a pound.*—Take a pound of raw sugar at 6d., melt it in one gill of clean water, and boil it to *Caramel* height, according to receipt No, 1, (see 620,) when ready, immediately pour it out upon a marble slab, which has been well polished, and smeared with oil or fresh butter; and lastly, when nearly cold, roll it out in stalks, as required. For further information (see article 703).

621. To colour Leather a Bright Red.—Dip your leather first in alum water, and rub it well therein; then take stale urine, boil it until it is half consumed, scum it well, and put into it an ounce of the best lake, Brazil wood two ounces, and an ounce of sal-ammoniac; stir them well over a moderate fire for two hours; pour off the liquid part, and brush over the skins with it, till it makes a good tincture, remembering always to let the skins dry between each going over with the brush, and by thus repeating the drying and brushing over, you will have skins stained to your wish.

622. *To discharge Prussian Blue Dye, (see 571), to suit any pattern.*—Take of pipe-clay and gum-arabic, and make it into a paste with a little water, in which has been dissolved one part of the supersulphate of potass, (see 701), and one part of oxalic acid. Print whatever figures, or flowers, or words you wish, with a proper cut block, on your Prussian blue ground, and let it dry, and the colour shall be discharged; and when washed, white figures, flowers, or words, will distinctly appear on a blue ground.

623. TO PREPARE PARCHMENT GLUE.—Take one pound of parchment and boil it in six quarts of water, till the quantity be reduced to one quart; then strain it off the dregs, and boil it again till it be of the consistence of glue. The same may be done with glovers' cuttings of leather, which makes a colourless glue, if not burnt in the evaporation of the water.—*A Gilder's Receipt.*

624. TO PREPARE STRONG CEMENT.—To prevent the escape of the vapours of water, spirits, and liquors that are not corrosive, the simple application of slips of moistened bladder will answer very well for glass;—and paper, with good paste, for metal. Bladder, to be very adhesive, should be soaked some time in water, moderately warm, till it feels clammy; it then sticks very well. If smeared with white of eggs instead of water, it adheres still closer.

625. TO PREPARE FIRE LUTE.—For a fire lute, take porcelain clay from Cornwall (not pipe clay); let it be pounded small, and mixed up to the consistence of thick paint, with a solution of borax, two ounces to the pint of hot water. For want of this peculiar kind of clay, slaked quick lime, mixed up in the same manner, may be used. This may be kept ready mixed in a covered vessel.

626. TO PREPARE COLD LUTE.—Take equal parts, by measure, of the above clay and wheat flour, mix them to a proper consistence with cold water; this is a very tenacious lute.

627. TO MAKE SIZE FROM POTATOES.—One of the uses of potatoes, not perhaps generally known, is, that the starch of them, quite fresh, and only once washed, may be employed to make size, which, when mixed with chalk, and diluted in a little water, forms a very beautiful white for ceilings. It has no smell, while animal size, which putrifies so readily, always exhales a very disagreeable odour. That of potatoes, is very little subject to putrefaction, and appears from experience to be more durable in tenacity and whiteness, and for white-washing, should be preferred to animal size, the decomposition of which is always accompanied by unhealthy exhalations.

628. TO PREPARE A MOST EXCELLENT GLUE.—Beat an ounce of isinglass to shreds: dissolve it gradually in a pint of brandy, by means of a gentle heat, and then strain the solution through a piece of fine muslin. The glue obtained should be kept in a glass closely stopped. When required for use, it should be dissolved with a moderate heat, when it will appear thin, transparent, and almost limpid.

When applied in the manner of common glue, its effects are so powerful as to join together the parts of wood stronger than the wood is itself united. The glue dries into a very strong, tough, and transparent substance, not easily damaged by any thing but aqueous moisture, which renders it unfit for any use where it would be much exposed to wet or damp air.

629. *The German Method of making Elm and Maple wood resemble Mahogany.*—Having very smoothly planed whatever board of elm or

maple tree intended to be used for the purpose of appearing like mahogany, wash them well with a little nitric acid diluted in common water; then take a few drachms of dragon's blood, according to the quantity which may be wanted in the whole, with half as much alkanet root, and one fourth the quantity of aloes: digest these ingredients in four ounces of proof spirits to every drachm of dragon's blood. As soon as the boards are dry, varnish them over with this tincture by means of a sponge soft painter's brush; and they will ever after have the appearance of mahogany.

631. SUBSTITUTE FOR MAHOGANY.—The difficulty of procuring mahogany and other precious woods, and the consequent exorbitant prices demanded for the ordinary articles of family convenience, has excited the chemist to exert his ingenuity to procure a substitute at a less extravagant price. It has therefore been contrived to render any species of wood of a close grain, so nearly to resemble mahogany in the texture, density, and polish, that the most accurate judges are incapable of distinguishing between the imitation and the native produce. The operation, as now practised in France, is to plane the surface, so as to render it perfectly smooth; the wood is then to be rubbed with diluted nitrous acid, which prepares it for the materials subsequently to be applied. Afterwards, one ounce and a half of dragon's blood, dissolved in a pint of spirits of wine, and one third of that quantity of carbonate of soda are to be mixed together, and filtered; and the liquid, in this thin state, is to be rubbed, or rather laid upon the wood with a soft brush. This process is repeated with very little alteration, and in a short interval afterwards, the wood possesses the external appearance of mahogany. When this application has been properly made, the surface will resemble an artificial mirror; but if the polish becomes less brilliant, by rubbing it with a little cold drawn linseed oil, it will be restored to its former brilliancy.

Notice to Correspondents.—"R. M. K." Kilmarnock, will find an article on Anderson's Pills in a future number; also, Ginger Wine. "A. T.'s" requests will be attended to as early as possible; Dantzic Black Beer has appeared already in a subsequent number. Tooth powder, also bitters sold in spirit cellars; ginger cordial, sold in spirit cellars; british wine, shrub, curling oil, Adelaide's perfume, polishing powder, will all appear in course; but really were I to attempt to introduce all the articles for which receipts are required in one number, it would require to be charged at least a sixpence. "R. B. a constant reader," who is desirous of making a voltaic pill, is informed that wet pieces of cloth must be interposed between the zinc and copper plates as he conjectures; it needs not to be soldered at all; a trough is not required. "M. Q. L." is informed for the reason already stated to A. T. that his request cannot be altogether attended to in next number. Turkey red, with its mordant, with the other *queries* respecting the laying of colour on glass for magic lantherns, composition for pounce sun-dials, will not be lost sight of; he is also informed that the plates *referred to* in this work may be had at the booksellers. "Eager reader" by calling at the editor will be informed where to find telescope glasses at a reasonable price. "A reader" is informed that the "long bottles in the mathematical instrument maker's window" will be described in an early number.

Stuart's Useful Information for the People, No. 30,

Being No. 18, of the

CHEMICAL EXPERIMENTALIST.

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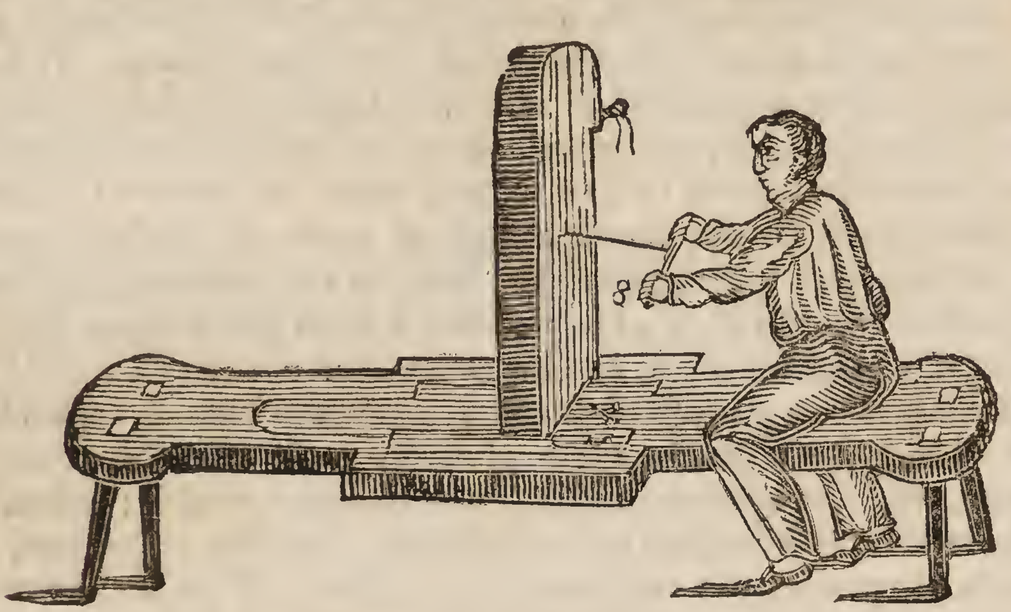
632. FIREWORK AND ROCKET PINCHING MACHINE.



633. CONSTRUCTION OF THE OGRE MAGIC LANTERN. (*See Fig. 4th, Plate 2nd, facing page* 121.) This design, as well as that referred to in article 607, is extracted from the French of M. Guyot, &c. In the first place, a magic lantern of the common construction (described 599) is required, and it is placed in a box, A, B, F, D, as seen (fig. 4th, plate 2nd.) In this box, and right opposite to the sight-glass of the magic lantern is placed a dressing-glass, (mirror M); this mirror ought to be moveable, in order that by means of it may be directed the *cone* of *reflected light* from the lantern, through the opening in the top of the large box, towards the smoke of burning incense arising from the chaffing-dish on the top of the pedestal or box. The hole in the top of the box, through which the light passes from the mirror M towards the *smoke* to form the picture thereon, ought to be furnished with a flap-lid with hinges, so that the opening may be covered, in order that the *inside* may not be seen. There must also be holes in the upper part of this box below the chaffing-dish, to let out the smoke from the lantern, and this chaffing-dish, to complete the description, should be enclosed in a painted tin box about a foot high, with a hole at top, which should also stand on four feet, to allow the escape of the smoke from the lantern within the box, A, B, F, D. The chaffing-dish should be large enough to contain several lighted coals, and be open at top to let the smoke escape therefrom. The next contriv-

ance is a pulley, (I), over which a cord must pass, which is attached to a painted figure suspended in the tube of the lantern, this cord passes to the outside of the box, and by pulling the cord, the figure can be either drawn out of the tube, or lowered down into it; *figures painted for exhibition, in the ogre majic lantern, should be painted in a contracted or squat form,* as the reflected images in this experiment are represented of a greater length, in proportion, than the drawing, or in a room.

634. To Make a Phantom Appear upon a Table.—The effect of the Magic Lantern (599) upon smoke, (which has been described 633), may be the means of producing very extraordinary illusions; if we *mask,* entirely, the cause of the phenominon. We can by its means, *all at once,* and at our will, make a phantom, or any other frightful object, appear in a dark room, which, from the undulating and transitory form of the divice, may be made to impress the beholders with the supposed image of some of their departed friends. When you have lighted the lamp in the lantern, (fig. 2nd,) place it in the box, A, B, F, D, (fig. 4th,) then place upon the box on a table, the chaffing-dish, *l,* with some *live* coal in it, and throw upon the coals some powdered incense, open the trap-door, and let drop the slide-glass with the spectral divice on it into the groove of the lantern, and the spectral illusion will become visible; when the smoke from the incense begins to diminish, shut the trap-door, and draw up the figure by the cord over the pulley. This experiment, when well executed, excites the idea of something supernatural in the shadowy appearance.

635. To prepare Anderson's Pills—*In answer to correspondent* R. M. K. Kilmarnock.—Take of socotrine aloes, one pound, and of the concrete milky juice of the root of scammony also one pound; let them both be bruised to a rough powder, and spread on the top of the portable evaporater (486), also add one pound of the pulp of colocynth, with eight ounces of the powdered root of Angelica, and to dissolve the whole into a mass, let one pound of the syrup of buckthorn be added. Set on the steam, and the aloes and scammony will dissolve; then stir the whole together till all are well mixed, and continue the steam heat till the mixture is evaporated to a consistency fit for making pills. This *compound extract* may be made into pills at any time when required.

Note. Anderson's pills, if often had recourse to as a purgative, are apt to produce piles, or where they already exist, aggravate the disease.

636. To prepare an excellent Pounce which will not soil the paper, *in answer to* M. Q. L.—Take of gum sandarac, and powder and sift it very fine. This is a superior pounce; when you have occasion to scratch out any writing, it will prevent the ink sinking into the paper.

637. TO PREPARE GINGER WINE, *in answer to* R. M. K. Kilmarnock.—Dissolve 20 lbs. of raw sugar into six imperial gallons of water, and boil it for half an hour, and take off the scum as it rises. Then take a small quantity of the liquor, and add to it half-a-pound of the best (unbleached) ginger bruised, also about 10 lbs. of raisins chopped very small, one ounce of isinglass and four lemons sliced, (*taking out the seeds*), pour all into an eight gallon cask, and when about milk warm, add half-a-pint of yeast, let the bung of the cask remain out for about three weeks, then bung it up for three months and it will be fit for the bottle. There will be about one gallon of the ingredients over, which the cask will not hold; this is required to be kept to fill up the cask as it works off, as it is necessary that it be kept full till it has done working. The raisins should be half Malaga, and one half Muscatel. Spring and autumn are the best seasons for preparing this wine. Another receipt will be given, (see 650.)

638. *Receipt 1st, to Masons.* LORD STANHOPE'S COMPOSITION FOR ROOFS.—*The composition with which the new palace, built on the site of Buckingham House, is covered.*—The first coat to be laid on the roof is a mixture of tar and chalk, which always remains elastic, and can never crack, as it has the property of dilating and contracting with the weather. A second coat is *laid on* of the same materials, with the addition of course sand to harden it, in order to make a firm bed for the slates, and these slates are imbedded in it while boiling hot. This composition forms a cheap, water-tight, and permanent roof.

639. MR. T. GRANT'S INVENTION OF VERTICLE PADDLES FOR STEAM-BOATS.—The construction of these paddles are exceeding simple, and may be thus described. About five feet above the water-line of the vessel, are two three-throw crank shafts, which project horizontally from the sides of the vessel, these shafts are driven by a centre and two spur wheels, the paddles are suspended from the foremost crank-shaft, and are kept in a verticle position during their motion by being tied by rods to the after *crank-shafts.* They thus act simultaneously, each paddle describing a semicircle. The advantages claimed for these paddles in the Nautical Magazine, is, that they may be unshipped with facility, the huge and unsightly paddle-box may be dispensed with, they have no tendency to beat the water on descending, or lift it in ascending.

640. M. PELLETAN'S MEMOIR ON THE DYNAMIC EFFECTS OF STEAM, READ BEFORE THE PARIS ACADEMY OF ARTS AND SCIENCES.—" A jet of steam," says Pelletan, " when thrown into a cylindrical conduit, or into a pipe filled with air, imparts its active power to the column of air, without any other loss of power than that occasioned by the friction in the conduit pipe. A jet of steam issuing through an orifice of a millemetre, (.03,937—100, 000 of an inch) under a pres-

sure of five atmospheres, possesses a velocity of five hundred and fifty-nine metres (1084$\frac{3}{8}$ feet) per second; it consequently moves at the same rate of velocity as a bullet discharged from a gun. By this enormous velocity, and of course power gained in so simple a form, there can be no doubts of my balloon's (see 606) possibility of navigating the air. Pelletan remarks that by this power the mechanic will be enabled to double and treble his gains, (a consummation devoutly to be wished for,) instead of its powers being limited as hitherto to filling the pockets of the great capitalists.

641. French Polishing Powder.—Put old scraps of iron into a tub, and cause it to rust quickly by sprinkling it with water, wash off the rust, allow it to settle, then dry, and calcine in a crucible, a violet and red oxide is formed, the red oxide serves for polishing gold and silver; the violet is fit for polishing steel. After calcination, it must be triturated and livigated to collect the finer parts.—"*Journal des Connoissances Nouvellis.*"

642. To coat Lead Pipes with Tin.—Melt your tin in a suitable bath, at a heat insufficient to melt lead, and let the lead pipes have rosin blown into them, the outside must also be sprinkled with it, and they are then fit for the process. The melted tin should be covered with rosin, fat, or some other suitable article to prevent its oxidation, and to aid in the tinning, all that is now necessary is to pass the pipe through the melted tin. If only the insides of the lead pipes require to be tinned, the outside must be overlaid with a mixture of lamp black and size.

643. An American invention to coat Cast-iron castings with Tin.—The surface of the casting is first made perfectly clean by *turning* or *scraping*, (filing does not answer so well), an amalgam is now made of tin and mercury, containing enough of tin to form a soft solid, say of the consistency of butter, at 60° Adilute solution of hydro-cloric acid (see 395, 103) (diluted with about half its weight of water) must now be prepared, and having heated the metal casting to such a heat as it cannot be conveniently held in the hand; dip a clean rag in the diluted acid, and wash with it the surface of the *casting* where it is meant to be tinned; then upon another piece of clean linen take up some of the amalgam, and pass it over the surface which has been wet with the acid; a portion of the amalgum adheres, and by rubbing the tin it is precipitated upon the iron to which it is united, and the surface is tinned; after which immerse the article in a bath of melted tin and rosin to perfect the coating.

644. GLASS HONES FOR RAZORS.—Let glass be cast in *moulds*, after the form of common hones, excepting the surface whereon the razor is meant to be ground, which should be rather of a rounded or convex form, (this form has been found to answer best), and let this surface be rough-ground or frosted by any of the

usual methods, and let a grain of a different fineness be given to its respective sides. Upon this hone the razor is to be rubbed in the usual wey, the hone being wet with oil or water.

645. HYDROGRAPHIC PAPER, *or white paper which when wrote on with a pen dipt in water, the writing will appear black and legible as if wrote with ink.*—Soak sheets of white paper in a solution of sulphate of iron, (see 8, page 4th), and dry them; then cover them with finely powdered galls, and put it through a calendar press, (see another hydro-graphic paper, 75I.)

646. CRUCIBLE FOR FUSION, *or how to melt one or two ounces of steel, without the least difficulty, in twenty minutes.*—Take a Hessian crucible that will hold about two and a half imperial quarts, and make a hole in its bottom. Put into this crucible the lid of a smaller crucible, so that it may rest about one-fourth from the bottom. Make several notches with a file around the edge of this cover to admit a free passage to the air, having the knob uppermost. On this knob place a small crucible containing the metal to be assayed or melted, and cover it. Then put some lighted charcoal around it, and then fill up with coke so as to cover entirely the innermost crucible, connect this apparatus with the bellows of a blacksmith's forge, keep up a constant blast, and supply the waste of coal as it is consumed, and in twenty minutes the steel will be melted. This simple and cheap apparatus may be the means of abridging time and labour wonderfully.

647. RECEIPT FOR SMEARING SHEEP, *at three half-pence each.*—Take 12 Scots pints of tar, 12 imperial gallons of clear seal oil, 3 imperial stones of potatoes, and 2 lbs of soda. Pare, scrape, and wash well, then boil on a good fire till the water is imbibed, then mash to a fine pulp. Pour the oil upon the potatoes, and mix the oil, soda, and potatoes all well together, then add one imperial gallon of urine; stir again well, and when about milk warm, pour the whole into the tar, when after ten minutes stirring, the whole will be perfectly incorporated, and fit for use in a few hours.

648. SWING FRAME FOR TURNING, DRYING, AND PRESERVING CHEESES.—Frame a dozen of strong shelves together, (let the shelves be of the ordinary breadth of cheeses), and let bars be nailed from top to bottom on one side, to prevent the cheeses from falling out while turning, and suspend the frame by two strong pivots, which may be supported one by the wall, and another by a strong post; two catches or snecks will serve to keep the frame upright, and prevent it from overturning. In using this frame, all that is required is merely to lay a cheese into a shelve above and below the level of the pivots alternately, till the shelves are full, the difference of weight therefore between the cheeses above the pivot and those below, can therefore never be more than one

cheese, therefore fifty cheeses may be as easily and quickly turned as one. The cheeses, in the act of turning, drop upon theshelves, which, in the former position of the frame were above them, and having been exposed to a current of air for 24 hours, become completely dry. Cheeses thus handled, are ripened and made ready for the market 5 weeks earlier than usual, and the mice and rats are non-plused.—*Abridged from the Repository of patent Inventions.*

649. THE CHEAPEST FILTERING MACHINE.—Take a large flower-pot, and put a piece of sponge over the hole in its bottom, break some charcoal to the size of peas, and mix it with an equal quantity of clean sharp sand; fill the pot three-fourths full with this mixture, and on this mixture lay a piece of linen cloth, large enough to hang over the sides of the pot. Pour in the water into the basin formed by the filter, and it will come out pure through the sponge by the hole in the bottom.

650. M. LAURENT, A FRENCH NATURALIST'S COMPOSITION FOR PRESERVING THE SKINS OF STUFFED ANIMALS.—Arseniate of potash, sulphate of alumina, (see 720). and camphor powdered, two drachms of each, white soap in powder, one half ounce, spirits of wine, six ounces, and essence of thyme, 30 drops. The arseniate, sulphate, camphor and soap, are to be placed in a phial with a large mouth, when the spirit of wine may be added, in 23 hours add the essence of thyme, and carefully cork the phial. When used, shake the phial, and spread it over the coat of the animal with a brush.

651. *Receipt 1st, for Painters*—TO PREPARE WHITE—WHITE LEAD.—White lead is a body colour for most whites used in oil painting, it is prepared by having an earthen vessel with an earthenware false bottom fixed about half way to its bottom; this false bottom should be barred like a grate. Put vinegar into the vessel till it nearly reaches this *grated bottom*, and place narrow slips of lead rolled up in scrolls over it. Cover the vessel with a lid, and place it in a gentle heat, when the fumes of the vinegar will corrode the lead, and reduce it to *white lead.*

652. METHOD OF OBTAINING CREAM FROM MILK.—The process of divesting the milk from its compound portion of cream, to an extent hitherto unatainable has been effected by a Mr. Carter. A four-sided vessel is formed of zinc plates, twelve inches long, eight inches wide, and six inches deep, with a false bottom at one-half the depth—the only communication with the lower compartment is by the lip through which it may be filled or emptied. Having first placed at the bottom of the upper compartment a plate of perforated zinc, the area of which is equal to that of the false bottom. A gallon, or any given quantity of milk, immediately taken from the cow, is poured into it, and must remain there at least twelve hours; an equal quantity of water must then be poured into

the lower compartment through the lip, it is then permitted to remain twelve hours more, that is twenty-four hours altogether, when the whole may be effectually reamed by gently raising the plate of perforated zinc from the bottom by the ringed plate, by which means the whole of the cream is lifted off in a sheet, without remixing any part of it with the milk below. With this apparatus, four gallons of milk, treated as above, produced in twenty-four hours, four pints and a half of clotted cream, which after churning only fifteen minutes, gave forty ounces of butter. Four gallons of milk, treated in the common mode in earthenware pans, and standing forty-eight hours, produces four pints of cream, which, after churning ninety minutes, gave thirty-six ounces of butter. The increase in the quantity of cream, therefore, is 12½ per cent, and of butter, upwards of 11 per cent.

653 A SPEEDY WAY TO EXTRACT ANIMAL AND VEGETABLE MATTER FROM WATER.—Put the water from the pipes into a pure white stone vessel. Take a piece of alum, the size of a common bean, and dissolve it in a little boiling water. Then pour the solution into about a gallon of water taken from the pipes, and in a few hours the noxious matter will be precipitated to the bottom of the vessel, and the water at the top will be perfectly pure, and fit for domestic use.

The first of these I have never tried myself, but I have it from a gentlemen who has witnessed the process often, and he assures me that it is at once the most simple and useful apparatus he has ever seen. Were it generally known, great improvements in its form might be expected, and thus a vast deal of trouble and expense might be saved. The latter of these I have often tried, and always found it to answer my expectations. The water of the Clyde is indeed remarkably pure, but still it contains some foreign matter, which this process separates. In other places where the water is more adulterated, this simple mode might be of great service.

THOMAS M'CUNE.

654. TO CLARIFY QUILLS.—Scrape off the outer film, and cut the ends off; then put the barrels into boiling water, wherein is a small quantity of alum and salt; let them remain a quarter of an hour, and then dry them in a hot pan of sand or an oven.

655. TO HARDEN QUILLS.—In order to harden a quill that is soft, thrust the barrel in hot ashes, stirring it till it is soft, and then taking it out, press it almost flat upon your knee, with the back of a penknife, and afterwards reduce it to a roundness with your fingers. Another method to harden quills, is by setting water and alum over a fire, and while it is boiling, put in a handful of quills, the barrels only for a minute, and then lay them by.

CONCLUDING ADDRESS.

My Friends and Readers,

In concluding this third part of the Experimentalist, I feel sincerely grateful for your continued patronage to my humble little work, and although I style it humble, I yet can, without being suspected of vain boasting, make bold to say, that from the time it has been in operation, by *it* has been communicated more real and truly-useful information (and for the insignificant sum of twenty-pence) to the population within the sphere of its circulation, than even by the *loftly-sounding* titled Edinburgh Encyclopedia, which costs almost twice as many pounds. In this part, from the numerous applications by correspondents for particular *receipts,* I have been unable to keep so near as I could have wished to the plan I had laid down at its commencement. Nevertheless, I consider it no ways behind the two preceding parts for experimental *receipts* of a useful character. Several correspondents have advised me to give an index now; but really the articles are so numerous, an index of them would require a number or two of itself; still, if it shall be thought an index will add to its usefulness, at its termination I shall consider it my duty to give one, where a number of experiments or receipts bear upon the same subject, such as in confectionary—Gilding—Painting— Distilling, and Dying. I mean, in these several branches to number them for more speedy reference, as for instance in sugar boiling. 597 is receipt No. 1, and 620 is receipt No.2, in that branch, and so on till that and similar subjects are completed. In this part many of the receipts are from actual experiment, and the remainder are in general from standard works of the first merit. In part fourth, Ballooning, Sugar-manufactory, Gilding, Painting, Dying and Distillation, will be principally treated on. I have also resolved that two lithographic drawings shall accompany the first and fourth numbers of each succeeding part; further, I pledge myself no means shall be wanting on my part to make the EXPERIMENTALIST the best and cheapest receipt book in print.

137, *Argyle St. Glasgow,*
April 30*th,* 1835.

☞ *Correspondents will be attended to next number.*

CALDWELL AND SON, PRINTERS, 2, NEW-STREET, PAISLEY.

THE

CHEMICAL EXPERIMENTALIST,

OR,

An attempt to allure by Experiment,

AND GUIDE BY REASONING,

THE ENQUIRER AFTER

RATIONAL AMUSEMENT and USEFUL KNOWLEDGE,

Towards the cultivation of the simple and sublime Science—

CHEMISTRY.

BY JOHN KNOX STUART, M.D.

FELLOW OF THE ROYAL PHYSICAL SOCIETY, AND EXTRAORDINARY MEMBER OF THE HUNTERIAN MEDICAL SOCIETY, EDINBURGH.

AUTHOR OF

"THE MONITOR," on Consumption—"THE SILENT FRIEND,"—"THE DIRGE," on Cholera—"THE ARCANA OF LIFE,"—"THE REFORMER'S ALMANACK, &c. &c.

Decomposition is that death-like scene,
Where Nature's laws decree, incessant, universal change;
While Composition's generative womb,
Prolific, gives birth, new form of life, and re-creates the whole.

PART FOURTH.

PAISLEY:
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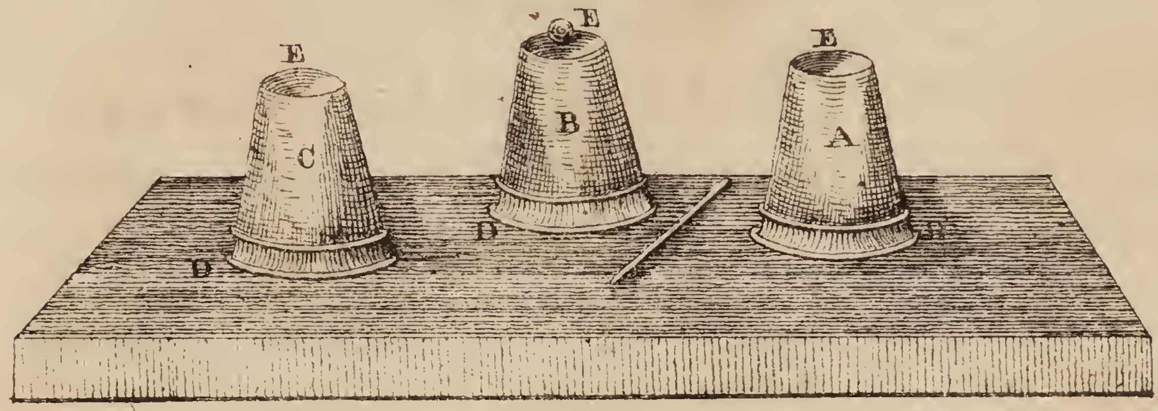
1835.

To Face **Plate 3** Page 146
of the Chemical Experimentalist.



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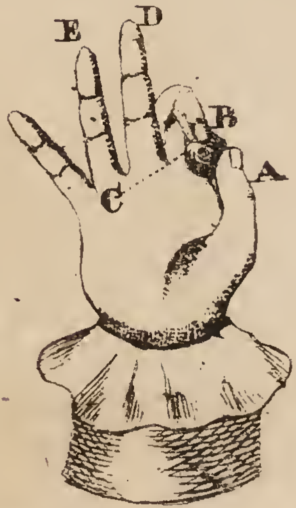

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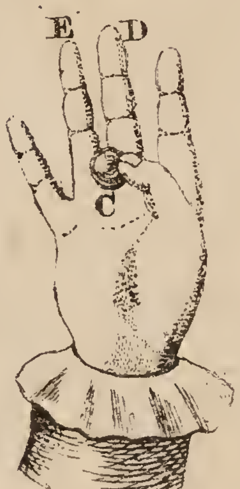

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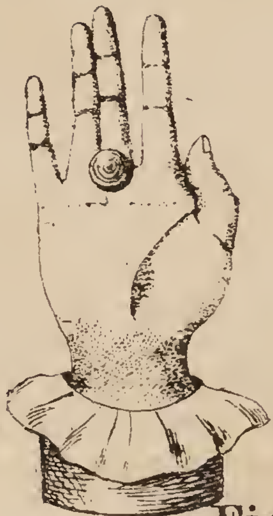

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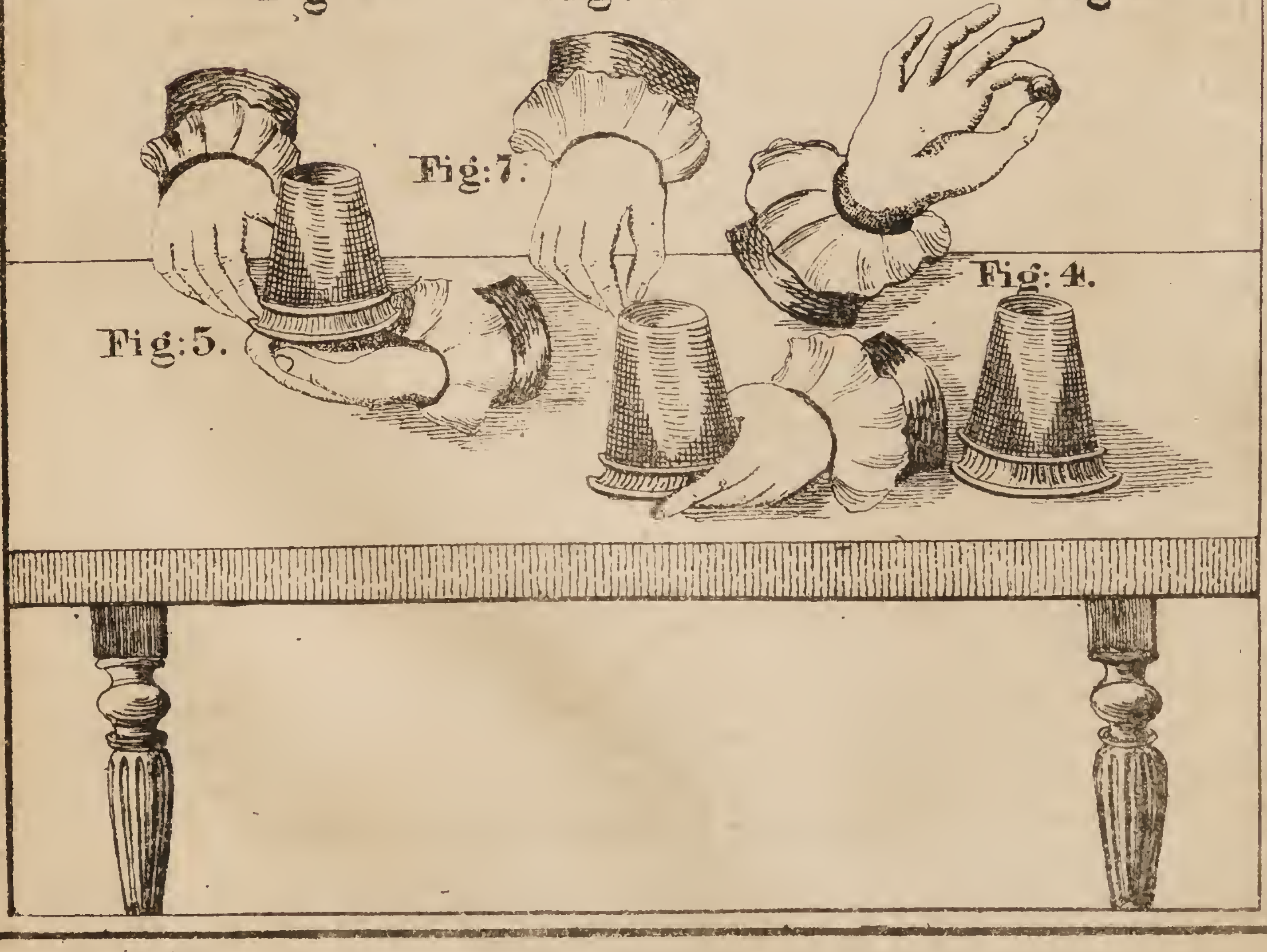

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Fig:5.

Fig: 4.

A. Smith lithog

Stuart's Useful Information for the People, No. 31,

Being No. 19, of the

CHEMICAL EXPERIMENTALIST.

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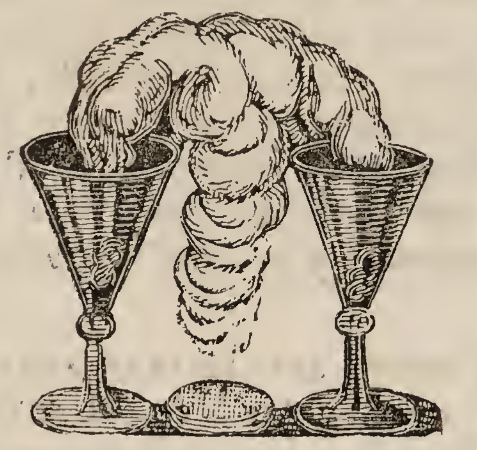
663. TWO GASES PRODUCING A SOLID.



664. Instantanious Production of Muriate of Ammonia—Sal Ammoniac.—When muriatic gas and ammoniacal gas are mixed together, they produce the solid salt, sal-ammoniac or muriate of ammonia. This experiment is very beautiful and is easily performed. Into two wine glasses (as seen in figure 663) put an equal quantity of powdered sal-ammoniac; then add quick-lime (235) to the one, and sulphuric acid to the other, when ammoniacal gas will be disengaged from the first, and muriatic gas from the second; and when these two vessels are made to approach each other, so that the evolved gases shall mingle, they then combine, and form white fumes of great density, which fall down, and may be received in a solid state in a vessel placed between the two glasses.

Observation—In the one case the sulphuric acid has more affinity for the ammonia then the muriatic; it therefore combines with the ammonia and forms the sulphate of ammonia, while the muriatic acid is set at liberty in the form of gas, and makes its escape from the wine-glass containing it. In the other case, the quick-lime (lime-stone deprived of its carbonic acid by burning) has a greater affinity for muriatic acid (see 103) than it has for ammonia; and *vice versa* the muriatic acid has a greater affinity also for lime, than it has for ammonia; they, therefore, (if I may be allowed a small license in speech for to benefit my illustration) rush into each other's arms, and become a wedded couple, to the exclusion of the ammonia, (see 156), which passes out of the glass, as if disdaining the new associated compound left in the glass, viz. the muriate of lime; but no sooner does it make its exit from the glass, than it testifies its abhorrence of the *single state*, by rushing into the embrace of the muriatic acid gas, that is just being expelled (or taking its leave *if you please*) from the wedded couple of *Sulpate of Ammonia* in the other glass; thus they, without publishing of *banns*, or any other *ceremony*, become a wedded couple, and fall down in each others arms in the form of a white powder into the vessel below, and are ever afterwards known by the name of muriate of ammonia.

My Readers– The above is a simple illustration of what is called chemical affinity. No sooner does the two bodies in a single state, the *acid* (sulphuric) and the *alkali* (lime) present themselves to the two wedded couples in the wine glasses, than all previous contracts are, as it were by mutual consent, dissolved, and each body, now single, enters into a new engagement, forming three married couples instead of two as before; thus overturning all that a "*Chalmers*" would say against our entering early into the blessed state of matrimony, and incontestably proving the abhorrence of nature to the single state.

665. TO MAKE A SPECTRE APPEAR AS IF RISING UP OUT OF A PEDESTAL OR TABLE, BY MEANS OF A MAGIC LANTERN, SUCH AS FIGURE 4th.—Figure 3rd, Plate 2nd, is a pedestal separate from the OGRE MAGIC LANTERN, so constructed, as that the appearance of the phantom may be more correctly represented than in experiment 634. In this pedestal, A. B. C. the fire is entirely shut up, by a door, (C) so that no vestige of it may be seen in the room, this pedestal is hollow and contracts from the base upwards to the top, where there is an opening of 8 or ten inches long, by half-an-inch in breadth; from this oblong opening, A. B. the smoke or fumes of the incense passes as it arises from the hot coals on the chaffing-dish L. the broadside of the fumes from the pedestal must be turned towards the rays of light issuing from the square opening in the roof of fig. 4th, and the spectral appearance will be painted on the smoke in a very distinct and surprising manner. This amusement is very surprising to those spectators who understand not the cause which produces it. Nor do they know to what cause to attribute the apparition or spectre, of which the head at first appears to rise out of the pedestal in the middle of the fumes, and disappears again in the same manner by sinking into it. It is easy to produce that effect by shutting the door, *h*, and slowly lowering and raising the spectral devise, (which is painted on the glass of the slide in the lantern) by means of the pully, P, I, in the ogre (*fig.* 4*th.*) It is necessary for executing this recreation with *tact*, that there should not be the smallest light in the chamber, and the pedestal should be placed in such a situation as that the spectators may not see into the interior; and the opening, A, B, in its top should be covered, (by which the cone of light passes) until the moment we wish the spectre to appear. This recreation, when well executed, appears very supernatural and grand.

666. GAMES OF LEGERDEMAIN.—Many of those who have purchased the preceding parts of this work, have suggested that some amusing recreative experiments should be mixed among its numerous articles, that might have a tendency *still farther* to excite the curiosity, and attract the attention of youth, and induce them to search through its pages after the knowledge therein attempted to be communicated, more as a pastime than as a task. The suggestion has appeared plausible to me, I shall therefore follow the example of M. Ozanam, by interspersing such a number of games and pieces of Legerdemain as shall contribute to the agreeable amusement of the readers of the EXPERIMENTALIST.

667. OF THE GAME OF THE JUGGLER'S BOX, OR CUPS AND BALLS. —This recreation or game is very ancient, very simple, and is very ingenious. It is also of all those performed by the address or *slight of hand* the most amusing, and the most easily performed. This game is usually performed with three goblets, cups, or tumblers of polished white iron, A, B, and C, (fig. 1st, lithographic plate 3rd). These tumblers ought to be made after the form of the trunk of a cone, as seen in the figure, having a double border edge or ledge, D, D, D, at their base, which ledge is for the purpose that the cup may be easily raised, to allow the hand to pass a small linen ball under it, which is in resemblance like a nutmeg) this ledge is about half-an-inch deep, the upper part, E, ought to be hollowed in the figure of a sphere to retain the *balls*, (for a receipt to make these balls see 706), otherwise they might turn over the edge of the cup. It is necessary also to be furnished with a little stick, which is called JACOB'S STAFF!! which is ordinarily made of ebony, and mounted with ivory at both its ends, we make use of it to strike upon the cups and the table, and as we take it frequently into the hands, it gives an opportunity to hide the balls, and vary their situation, without which it would sometimes be found very difficult to perform the intended deception without being perceived. The whole *knack* of this game consists principally in *slyly* hiding a *ball* in the right hand, and making it appear and disappear between the fingers of that same hand. Every time that we hide the ball between our fingers, B, it is called *escamoter la muscade;* it is necessary that the spectators be led to believe that we have put it into the other hand, or else passed it under one of the cups.—*To be continued at article* (707).

668. NOTICE OF HALLEY'S COMET—*May 16th*, 1835.—Dr. Lardner supposes that this comet has now passed the planet Herschell, but is unable to tell how long it might be detained there while passing, from the mass of that planet being as yet unascertained. He further supposes that it may now have advanced so far toward us and the sun as to be about the orbit of Saturn. Mr. Lubock expects it to appear about 31st October, Mr. Damoiseau 5th November, and Pontecaulet about the 8th or 14th November—*upon the 10th of Nov. it will be nearest the earth.* It will be visible at the

three last stars of the great bear, after sunset and before sunrise. Let us have our telescopes ready (see how to prepare a telescope to view celestial bodies for one shilling, 551, 552).

669. COMET OF 1770.—This Comet at one time took 50 years to revolve in its orbit, but in 1767 it came in contact with Jupiter, and was detained there six months when its course became entirely changed, its eclipses was then changed to an orbit of 5½ years. Jupiter makes a journey round his orbit in about 11 years, (11 years, 315 days, 14 hours), whereas the comet, in its new course, only took 5½ to accomplish its journey; the consequence was, that when Jupiter had made *one* revolution, the comet had just made *two*. They therefore met again, and the consequence was that this comet's orbit was again changed, and it now traverses space in an orbit of 21 years.

670. OF THE PLANET HERSCHEL.—Dr. Herschel discovered this planet on the 13th day of March, 1781. It is the last planet of our system, (so far as yet discovered) it revolves in its orbit at the distance of 1800,000,000 (eighteen hundred millions) of miles round the *sun*. Its diameter (a line run through its centre) is 35,112 miles. It is about the same density as water. There is 16,840 times the quantity of matter in it when compared with our earth. A heavy body falling at its surface would pass through 4¼ feet in a second, at our earth 16 feet. Its annual revolution round the sun is 30,637 days, 4 hours, or about 84 of our years. On a clear evening it may be seen by the naked eye when the moon is absent. It has six moons (Satellites) which revolve round it, and are visible to the *naked eye;* and these satellites move in a plane nearly perpendicular to the plane of Herschel's orbit, and contrary to the signs.

671. OF THE PLANET SATURN.—This is the most remote planet of our system, excepting "The Herschell," and it is in the neighbourhood of its orbit that Dr. Lardner supposes *Halley's Comet* to be now, in its progress towards us and the sun. The distance of Saturn from the sun is 900,000,000. (nine hundred millions) of miles.—Its diameter is 79,042 miles. It contains 103.950 (or about 130) times as much quantity of matter as our earth does; a body falling at its surface would fall through 15 feet in a second. His year is about 30 times as long as ours. Saturn scarcely receives one-eightieth part of the intensity of direct light of the sun, as our earth does, but it has its rings and seven moons to supply the deficiency.

672. POSSIBILITY OF A REPETITION OF THE DELUGE OR FLOOD.—It will be seen by refering to article 669, that comets *do come in contact* with the planets, and that the consequences of such contacts must be very serious indeed. For instance, the splendid comet of 1770, which revolved in its elliptical orbit, through the wide confines of space, requiring 50 years to complete one revolution, comes in contact with the largest of all the

planetary bodies, **JUPITER**, and what is the consequence? why, it gets entangled with this immense planet, and is dragged along with it through space during six months, at the rate of 25,000 miles an hour; but is it to be supposed that even immense Jupiter remained unhurt by the entanglement? I think there can be no reason to suppose such a case; for as sure as effects are corresponding to the momentum (if I may so speak) of the cause multiplied into its weight, so surely did Jupiter suffer by the visit of the 1770 comet, and although Jupiter, from his great magnitude, has not been sensibly to us deranged in his motion through his orbit, yet his moons must have suffered severely. There cannot be the smallest doubt but that innundations and disruptions of Jupiter's planetary constitution took place then, therefore what has been the state of Jupiter and his moons with respect to the 1770 comet, may be ours under similar circumstances, with this difference, that a *comet* that could struggle for 6 months with such an immense planet as Jupiter, (and secure its liberty at last) would have dragged us without much ceremony out of our orbit, towards the remotest confines of the solar system. We now travel in our orbit at the rate of 68,000 miles an hour, but once taken under the guidance of such a comet, as that of 1680, according to Sir Isaac Newton's calculation, we would then glide through space at the rate of 800,000 miles an hour.

673. RULE TO CALCULATE THE MEAN DISTANCE OF ANY COMET FROM THE SUN—*Also to find out its nearest (or perihelion) and its farthest (or aphelion) distances therefrom—Also, how far this Comet of Halley's, (expected this year), flies off from the sun when farthest from it—Also, how near it will approach it at this visit.*—The analogy between the periodical time of the planets, and their distances from the sun, discovered by Kepler, takes place also in the comets. Hence, the mean distance of a comet from the sun may be found by comparing its period with the time of the earth's revolution round the sun; thus, the period of the comet that appeared in 1531, 1607, 1782, and 1759, being about seventy-six years, its mean distance is found by this proportion: as the square of one year (the earth's periodical time) is to 5776 the square of 75, (the comet's periodical time); so is 1,000,000, (*the earth's mean distance from the sun,*) to 5,776,000,000 the cube of the comet's mean distance, the cube root of which is 1794, (the mean distance itself), in such parts as the mean distance of the earth contains 100. If the perihelion distance (comet's least distance from the sun) of this comet, 58, be taken from 3588, double the mean distance, we shall have the aphelion distance 3530 (comet's greatest distance from the sun) of such parts as the distance of the earth contains 100; and this is a little more than 35 times the distance of the earth from the sun. By a like method, the aphelion distance of the comet of 1680, comes out 138 times the mean distance of the earth from the sun, supposing its period to be 575 years so that this comet in its aphelion, goes no more than 14 times the distance from the sun that Saturn does.

674. WHAT MIGHT BE THE CONSEQUENCES OF HALLEY'S COMET PASSING OUR ORBIT TOWARDS THE SUN.—It will be seen by article 673, that Halley's comet must cross our orbit to get nearer the sun than our *earth*. Also, when nearest the sun, the comet is only 58 of the same proportions distant of which our earth is 100, therefore it is possible, and not *improbable*, that if some other comet does not, Halley's comet may at some period (and that period perhaps not very far distant) come within the sphere of its own and our earth's mutual attractions, and then who would presume to doubt but the result must be awful. I will simply ask what might be the consequences, if our earth were dragged out of her *orbit*, (that circle which she describes round the sun in a twelvemonth) through space first till she were half as near the sun as she now is, and again whirled off till she was 35 times her present distance from it, in company with this comet? Why, our seas and rivers would overflow their banks, our atmosphere would be deranged, our winds, tides, seasons, would be annihilated. But if it came not *just* so close it might yet perform a glorious universal change, though not very pleasant to be contemplated by the inhabitants of our world, viz. if it were approaching so near the moon as merely to exercise a greater attraction for it than our earth, why the consequence would just be that our moon would go off with the comet, and leave us moon-lightless, and without tides on the ocean; and you ask what would be the appearance of the phenomenon? Why it would just be this; we would see the moon, instead of rising or setting as usual, rising and setting in company with and revolving round this comet; and we would see the comet carrying her away toward the sun twice as near as she now is; and finally we should see them retire into space in each other's company, never to be seen again by the inhabitants of this earth for the space of 76 years, verifying the prophecy, "*And the moon shall be darkened.*"

NOTICE TO CORRESPONDENTS.—"W. G. Greenock," is respectfully informed that it will not be in the publisher's power (from the attention required by his medical duties) to publish the EXPERIMENTALIST oftener than once a fortnight. He is also informed that the 18th number would have been out on its regular day of publication, but for a religious printing squabble at Paisley. "J. P.'s" three queries have been received, and will be answered—"J. W. a constant reader's" very flattering eulogium on the utility of the Experimentalist gives much satisfaction to the publisher. With respect to an index, it will be added at the end of the work, perhaps at the end of next part. Those persons who intend to complete the series of the numbers of the Experimentalist, with the plates, would do well to make an early call at the booksellers, as in a few days the early numbers, comprised in the first part will all be stitched up in covers. Plate 3rd accompanies this number.

Stuart's Useful Information for the People, No. 32,

Being No. 20, of the

CHEMICAL EXPERIMENTALIST.

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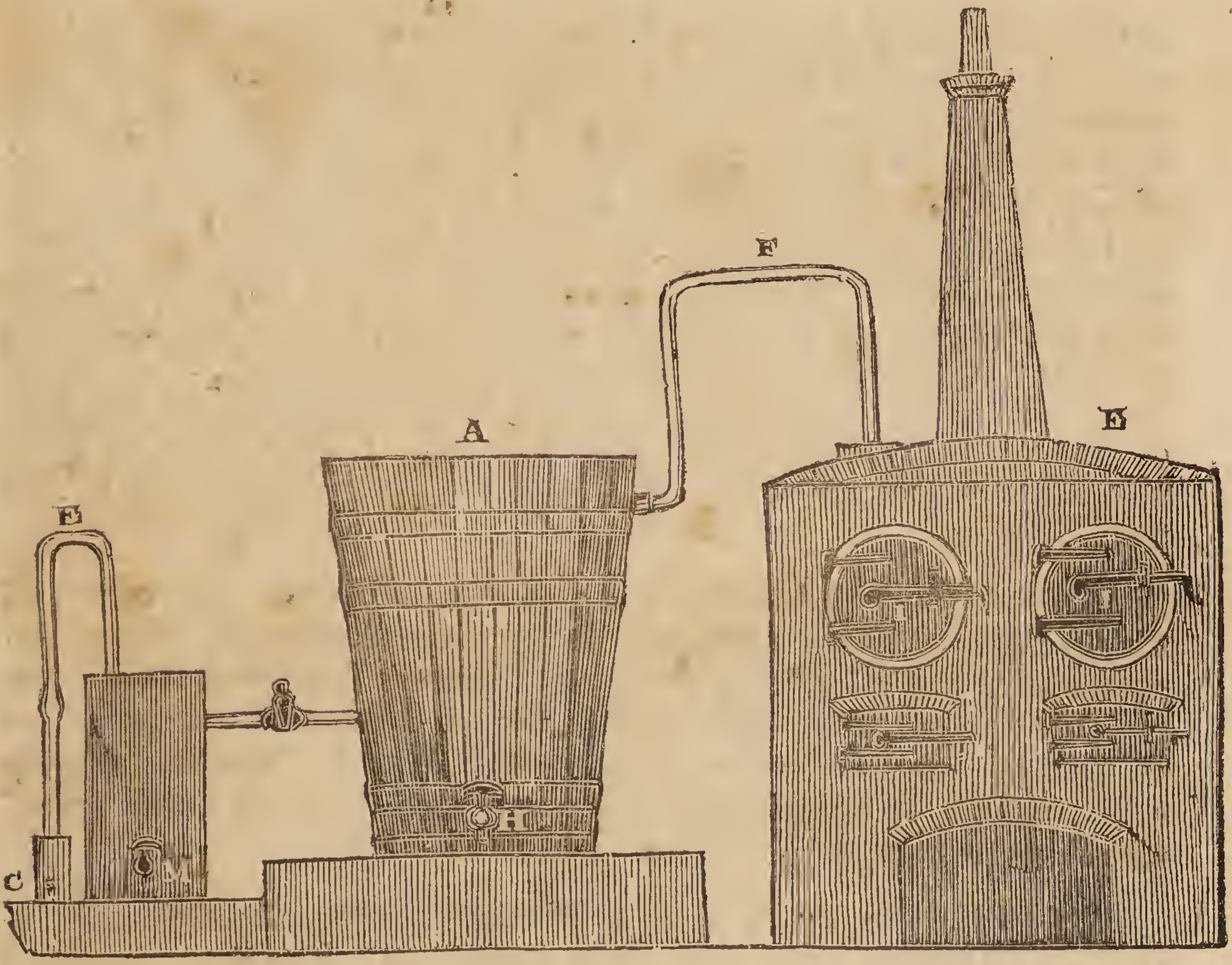
675. Distilling Apparatus for extracting Vinegar from Wood.



676. Possibility of our Moon leaving us, and becoming a Moon to some other Planet.—In the event of our moon being carried off by Halley's comet, there is implied the same possibility of her falling within the attraction of some other of the *great planets,* whilst passing outwards through their orbits in company with the comet, the consequence might be that she would then leave the comet, and revolve as a fifth moon around Jupiter. *To be continued.*

677. To make a Metal which resembles Gold, not only in colour, but also in specific gravity, density, and ductility.—Take of virgin platina, eight ounces, copper three ounces and a half, and zinc one half ounce, all equally pure. Melt all into a

uniform mass in a crucible covered with powdered charcoal, and this metal will be the product. *(See Dr. Hermstadt's discovery.)*

678. To prepare (*insect eating*) Bird's Meat, called German Paste.—Take 4 fresh eggs, and boil them very hard, 4 ounces of pease-meal, add one ounce of good and sweet salad oil; grate the eggs down very fine, and mix them with the meal and oil; then press the whole through a calender, to form it into grains like small shot; then in a frying pan let it be partially roasted till of a fine yellow brown colour, while on the fire it must be kept stirring; nightingales are very fond of this food, and thrive well upon it.

679. The late Emperor Bonaparte's plan for opening letters sealed with wax, and re-sealing them again, with the same impression.—I have been told the means whereby this great man effected the opening, and (after having read the contents) re-sealing the letters sent through the French post-office, was merely by taking pieces of sheet-lead, and laying them over the wax of the letters required to be opened, laying them over a hard body, and striking smartly with a hammer, the seals were knocked to atoms, while the impressions were left (of the engraving) on the lead, fit for re-sealing the letters again, giving true impressions of the seal on the wax as before it had been broken. I have been told his whole mornings work, and that of the principal directors of the post-office, was opening, reading, and re-sealing letters.

680. AMALGAM.—The alloy of mercury with any metal, if the mercury predominates so far as to render it soft, and of the consistence of butter, is called an amalgam. These amalgams are employed in silvering and gilding, as the mercury is easily driven off by heat, and the metal is left fixed behind. The metal with which the backs of looking-glasses are coated, is an amalgam of tin and mercury.

681. Amalgam of Tin and Mercury for Electrical Machines.—*Cavallo* directs two parts of mercury to be amalygamated with one part of tin in the form of tin-foil, and then adding a little powdered chalk; let the whole be well mixed till it becomes a mass like paste.

682. The very best Amalgam for Electrical Instruments—The Amalgam of Zinc and Mercury.—Heat four or five parts of mercury higher than the boiling point of, (212°) and have in readiness one part of melted zinc; pour the heated mercury into a wooden box, and immediately pour the melted zinc upon it; close the box, and shake it for half a minute till cold; then by trituration mix it with a small quantity of tallow or mutton suet, and a very small quantity of whitening. This *amalgam of zinc* mixed with about one fourth part of the amalgam of *tin*, (see 681) is the very best amalgum for Electrical Machines.

683. ALUMINA.—This earth has neither smell nor taste while dry; it is soft to the touch, and adheres strongly to the tongue; by exposure to an intense heat it is imperfectly fused, and becomes so hard as to strike fire with steel, and to be capable of cutting glass. Its specific gravity is 2.00. It is scarcely soluble in water; but when dry, it is capable of absorbing 2½ times its weight of water, and easily mixes with a greater quantity to form a paste; it is soluble in all acids, and in solutions of caustic potash, and soda. It is often called argil or pure city. Alumina derives its name from alum, from which salt it is obtained in the greatest purity. Common alum is chiefly a sulphate of alumina.

684. TO OBTAIN ALUMINA PURE.—Dissolve alum in hot water, and add ammonia or potash to the solution, so long as any precipitate is formed. Decant off the fluid, and wash the precipitate in a large quantity of water. This precipitate is alumina, combined with only a small portion of sulphuric acid, whereas, in the state of alum, it is supersaturated with the acid. If this precipitate be dissolved in muriatic acid, the solution evaporated till it deposits crystals in cooling, these crystals separated each time after repeated concentrations of the solution; and lastly, a precipitate formed by ammonia, alumina nearly pure will be obtained.

Alumina cannot be artificially crystallized; but it is found native in beautiful transparent crystals, of great hardness, and of the specific gravity of 4. In this state it forms the precious stone called sapphire. Alumina is of great importance to mankind, combining readily with greasy substances, it is of the first importance in scouring cloth, to which use it is often applied in the form of pipe clay; but, in manufacturies, fuller's earth is chiefly used, which is alumina mixed with very fine silex. Alumina is the base of all earthenware and porcelain, and its utility for these purposes renders it of great consequence. In one province of China, five hundred furnaces and nearly a million of men, are said to be employed in the manufacture of porcelain.

The basis of alumina is the metal aluminum, which may be obtained in the form of a grey powder, by causing potassium to act on chloride of aluminum. It burns splendidly in oxygen; and an oxide is procured, which is alumina consisting, according to Thomson, of 100 parts of aluminum, and 8 of oxygen.

685. AN OBJECT BEING PLACED BEFORE A CONVEX GLASS TO MAKE IT APPEAR BEFORE IT.—Provide any object, as, (for example) a small arrow of wood about an inch and half in length, and tie it perpendicularly to a piece of black card, and place before it a double convex glass, two or three inches in diameter, in such a manner that it may be distant from the arrow about twice the length of its own focus. Then make a person stand at a proper distance opposite to the glass, and the arrow will appear to be suspended in the air before the glass.

Note. It is advantageous to fix this convex glass in a piece of circular pasteboard blackened, of about half a foot in diameter, and the illusion will be more perfect. (See next article)

686. OPTICAL ILLUSIONS.—We can, upon the above principle, divise different amusements of a very agreeable nature, by causing to be constructed, a case or box resembling (fig. 5th, plate 2nd) shut on all sides, and divided into two unequal parts, by means of a partition, in which partition is formed four circular holes, placed right in front of the line L, in the side A, B, D, of that case; we then fix in the small division of the case, a circular card, (fig 6th same plate), which turns upon its centre, so as to present before one of the holes, 1, one of its four openings, M, N, O, P, and we adjust upon each of the openings a piece of very transparent paper, painted and shaded, which may represent any four different objects we may wish, and which we shall be able, at our will, to make appear before the glass, I, by means of a light placed in the small end of the case.

Note. No light should be admitted into the large end of the box.

687. The method of rolling Cases for Rockets.—Having explained the manner and form of the mould and its dependants, (see 337, 338), we come now to treat of their use. 1st, *The use of the* roller, (fig. 2nd, article 320). The cases must be made of good strong cartridge paper cut, so that it may be one inch longer than the mould. Take your roller, and one length of paper, and begin to roll. When you have rolled one sheet, you must, in order to make your case as hard as possible, place it on some smooth table or board, hold your roller in your left hand, and the board in your right; roll it very hard one way, proceed so with every sheet, till it is big enough to fill the mould very tight; when you have so done, draw forth your roller one inch, and then (D) as you see described, prepare to choak.

688. HOW TO CHOAK A ROCKET.—You must have a ring to screw into some post, to which ring you must tie your cord, which cord must be bigger or less, according to the size of your rocket; for a small cord will not choke a great rocket; and, *vice versa*, a great cord will not choke a small rocket; for it will make too great a choke, (see rocket pinching machine, 632); on that account you must have small cord and large cord. When you have provided yourself with these cords, tie one end of your cord to the ring; and about a yard off tie the other end of the cord to a strong stick. Having twisted the cord, put the stick between your legs, and wind the cord about the rocket case, in the place appointed, (see fig. 632); and when you have so done, girt it by degrees, continually turning your roller, in order that it may come close and neat: when you have choked it sufficiently, draw forth your roller, and where your choking is, tie it about with strong packthread, and then you have a case ready to be filled when occasion requires.

689. For Rockets from one ounce to three.—Take only powder dust, well sifted, and fine, which rises swiftly, but carries no tail. The ordinary quantity for small rockets, under four ounces, is, of mealed powder 1 lb. saltpetre 2 oz. coal-dust, or charcoal 2 oz.

690. Rockets of four ounces.—Meal-powder 1 lb., saltpetre 4 oz., charcoal 3 oz.

691. Rockets of eight ounces.—1st. Meal-powder 1 lb., saltpetre 4 oz., brimstone 3 oz., charcoal 1½ oz. 2nd. Meal-powder 1½ lb., charcoal 4½ oz.

692. Rocket of one pound.—Meal-powder 2 lb., saltpetre 8 oz., brimstone 4 oz., charcoal 2 oz., steel-filings 1½ oz.

693. Sky Rockets in general.—1st. Saltpetre 4 lb., brimstone 1 lb., charcoal 1½ lb. 2nd. Saltpetre 4 lb., brimstone 1½ lb., charcoal 1 lb. 12 oz. meal-powder 2 oz.

694. To detect dampness in a Bed.—Let your bed be first well warmed, and immediately as the warming-pan is taken out, introduce between the sheets, in an inverted direction, a clear glass tumbler, after it has remained in that situation a few minutes, examine it; if found dry, and not tarnished with drops of wet, for there will often appear a slight cloud of steam, the bed is safe; but if drops of wet or damp adhere to the inside of the glass, it is a certain sign of a damp bed. Even wearing apparel, when on the person, will, in most parts of England, by the application of a warming-pan, stain glass with a slight steam, but not drops of wet. If the sheets are damp, take them off, and sleep in the blankets.

695. Easy method of preserving Animal Food sweet for several days in the height of Summer.—Veal, mutton, beef, or venison, may be kept for nine or ten days perfectly sweet and good in the heat of summer, by lightly covering the same with bran, and hanging it in a high and windy room; therefore a cupboard full of small holes, or a wire safe, so as the wind may have a passage through, is recommended to be placed in such a room, to keep away the flies.

696. Useful method of preserving Bees in Winter, as lately adopted in America.—Instead of destroying whole swarms in their hives, to get the honey when the hives are full, they clear them out into a fresh hive, while they take the combs out of the old one; and they prevent their perishing in winter by putting a great quantity of honey into a very wide earthen vessel, covering its surface with paper, exactly fitted on, and pricked full of holes with a large pin, this being pressed by the weight of the bees, keeps a fresh supply continually arising. Their most fatal destruction by severe cold they prevent, by taking as may large tubs as they have hives, and knocking out the heads, they set the other end in the ground, lay-

ing a bed of dry earth or chopped hay in it, of six inches deep; over this they place the head knocked out, and then make a small wooden trough for the passage of the bees; this is transfixed through a hole cut on each side of the tub, at such a height as to lay on the false bottom, on which is placed the covered dish of honey for the food of the bees, leaving a proper space over this, covered with strong matting; they then fill up the tub with more dry earth, or chopped hay, heaping it up in the form of a cone, to keep out the rain, and wreathing it over with straw on account of the warmth. This method is so secure, that out of a hundred tubs, a few winters since, when this experiment was tried, not one of them was known to fail. The quantity of honey this way obtained has been amazing, and besides, must every year increase, wherever the example is followed.

697. TO MAKE ARTIFICIAL, OR POTATOE BREAD.—Put a pound of potatoes in a net, into a skillet with cold water, and lest the skin break and let in the water, hang it at a distance, so as not to boil, over the fire till they become soft; then skin, mash, and rub them so as to be well mixed with a pound of flour, a very large spoonful of salt, and two large spoonfuls of yeast; but less of the yeast is better. Then add a little warm water, and knead it up like other dough; lay it a little while before the fire to ferment or rise, then bake it in a very hot oven. Bread made in this manner has been frequently tried, and found to be well-tasted, wholesome, and of good consistence.

698. METHOD OF MAKING STILTON CHEESE.—Take the night's cream, and put it to the morning's new milk, with the rennet; when the curd is come, it is not to be broken, as is done with other cheeses, but take it out with a soil dish altogether, and place it on a seive to drain gradually, and as it drains, keep gradually pressing it till it becomes firm and dry; then place it in a wooden hoop; afterwards to be kept dry on boards, turned frequently, with cloth-binders round it, which are to be tightened as occasion requires,

In some dairies, the cheeses, after being taken out of the wooden hoop, are bound tight round with a cloth, which cloth is changed every day until the cheese becomes firm enough to support itself; after the cloth is taken away, they are rubbed every day all over, for two or three months, with a brush; and if the weather is damp or moist, twice a day; and even before the cloth is taken off, the top and bottom are well rubbed every day.

N. B.– The dairy-maid must not be disheartened if she does not succeed perfectly in her first attempt.

699. Dr. Stuart—I beg to congratulate you upon the usefulness and simplicity of the self-preparing oil gas lamp which you have recommended in your truly cheap and entertaining publica-

tion, the EXPERIMENTALIST; and as a proof of its efficacy, I may inform you that I had the pleasure of witnessing its effects some nights ago in the "Vale of Leven Mechanic's Institution," where, after a very superior lecture delivered by Mr. Knox, on a branch of Natural Philosophy, he proceeded to exhibit n lamp constructed on the principles which you have laid down in the EXPERIMENTALIST. I need scarcely add that it gave the greatest satisfaction to all present; and that active preparations are making to have a sufficient supply of them against the next winter. Its exhibition has likewise been the means of bringing your publications into more extensive circulation in this quarter.

With ardent wishes for your success, I remain, Sir,

Yours respectfully,—ARCHIBALD BUCHANAN.

Vale of Leven, 20th April, 1835.

The editor feels very proud of the above testimonial, and begs to inform the readers of the EXPERIMENTALIST, that before winter, a new cut and description of an improved portable self-preparing oil gas lamp, will appear in its columns.

700. DUTCH METHOD OF PREPARING GOOSE QUILLS FOR WRITING. —The process consists in immersing the quill, when plucked from the wing of the bird, into water almost boiling: and leaving it there till it becomes sufficiently soft to compress it, turning it on its axis with the back of the blade of the knife. This kind of friction, as well as the immersion in water, to be continued till the barrel of the quill be transparent, and the membrane, as well as the greasy kind of covering, be entirely removed; it is immersed a last time to render it perfectly cylindrical, which is performed with the index finger and thumb; it is then dried in a gentle temperature.

701. TO MAKE WAFERS.—Take very fine flour, mix it with the glair (or white) of eggs, isinglass, or a little yeast; mingle the materials; beat them well together; spread the batter, being made thin with gum water, or even tin plates, and dry them in a stove; then cut them for use. You may make them of what colour you please, by tinging the paste with brazil or vermillion, for red; indigo or verditer, for blue; saffron, turmeric, or gamboge, for yellow, &c.

702. TO STAIN SKINS GREEN.—Bruise a good quantity of the leaves of nightshade, and dissolve in the juice well strained out, about ten ounce of alum; then put in half an ounce of verdigris; suffer them to stand over a gentle fire twenty-four hours; when warm, dip in a brush, and strike over your skins; let it dry, and repeat it till it has taken a pleasant green.

703. TO PREPARE SUPER-ACETATE OF LEAD—SUGAR OF LEAD.—Boil carbonate of lead (white lead see 651) in acetic

acid, (vinegar), till it is saturated; then strain through paper, and evaporate away the water upon the portable evaporater (486) until a pillicle is formed on the surface; then set it aside to crystalize; pour off the water, and dry between folds of bibulous paper.

704. INDIGO is a light substance of a deep blue colour, with a slight shade of violet or copper, and the lightest is in general the best; water boiled upon it dissolves only about one-tenth part of its weight, but none of the colouring matter is dissolved, it is generally impure Bergman found in 100.

Pure Indigo,	47
Gum,	12
Resins,	6
Earths,	22
Oxide of Iron,	13
	100

Alkaline solutions and lime water does not dissolve it, unless when newly precipitated, but in this state it is soluble by carbonate of ammonia, but not by the fixed carbonates. It is insoluble in alchohol ether, and in fixed and volatile oils; its only appropriate solvent is concentrated sulphuric acid, (vitriol), when thus dissolved and then diluted with water, it dyes SAXON BLUE. Indigo becomes soluble by the abstraction of the oxygen, (and then its colour is changed from blue to green), which is effected by allowing it to ferment with bran or other vegetable matter, or by decomposing it in contact with the proto-sulphate of iron (see 704) by the addition of lime. It recovers its former colour again by exposure to the air, when it re-absorbes its oxygen, and becomes again insoluble in water, it is therefore then *fast colour*, and is so permanent that it is not removable by either soap or acids.

605. SULPHATE OF INDIGO.—Rub indigo in a mortar to a very fine powder, then pour upon it strong oil of vitriol, and a solution of sulphate of indigo will be formed.

661. CHEMICAL ANTIPATHY.—Write with a solution of sulphate of indigo, (660), and near to the same line write with a solution of acetate of lead, (658), the one is blue, the other invisible, but by washing them with a clean camel's hair brush dipped in sulphuret of ammonia, (see 705), the blue writing instantly disappears, and the invisible turns black.

662. VALUE OF EARLY RISING.—The difference of rising every morning at six and at eight, in the course of forty years, supposing a man to go to bed at the same time he otherwise would, amounts to 29,000 hours, or three years, 121 days, and 16 hours, which will afford eight hours a-day for exactly ten years; so that it is the same as if ten years of life were added.

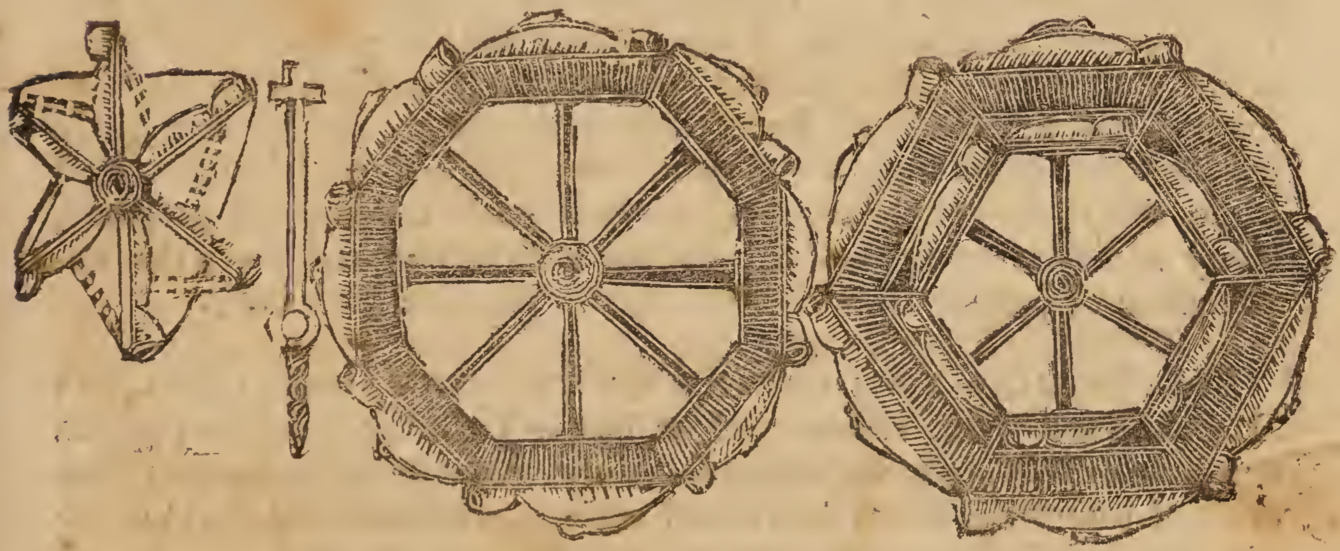
Stuart's Useful Information for the People, No. 33,

Being No. 21, of the

CHEMICAL EXPERIMENTALIST.

SINGLE AND DOUBLE ROCKET FLYERS.

708. 709. 710. 711.



712. RECEIPT No. 3, ON SUGAR BOILING.—To make what is commonly called Gibralter Rock, clean and good at 6d. a pound.—Having dissolved your sugar, and boiled it as directed (597) but just a degree less brittle. Let it be poured out as recommended at 620, and when it begins to get so cold as it can be doubled up, (having your hands washed very clean, but free from damp), fold it up repeatedly till it is all of an equal thickness and tenacity, and by repeatedly drawing it out and extending it, and lapping it up, it shall become light, porous, and white. It may be flavoured with any palatable oil, such as a few drops of oil of cinnamon, peppermint, or lemon being poured on the melted mass of sugar on the slab before you commence to whiten it by extension, according to the kind of oil made use of in perfuming it, it is called cinnamon, lemon, or *Peppermint Rock.*

Note. If it be required very white and clear, an iron hook is fixed to or in the wall, about five feet from the floor, and it is speedily whitened, by nimbly pulling and doubling it over this hook. *To be continued.* (See article 753).

713. SUPER-SULPHATE OR BI-SULPHATE OF POTASS, *referred from 622 to 701.*—This salt may be obtained by dissolving the mass which remains in the retort after the distillation of nitric acid from equal weights of nitre and sulphuric acid, (see 186) in hot water filter, evaporate and let it remain at repose, and crystals of the salt super-sulphate of potass will be formed; it is composed of

Potassa, ..	48	or	1 atom.
Sulphuric acid,	80	or	2 atoms.

It has an intensely sour taste, and a powerful action on vegetable blue colours. It is soluble in twice its weight of water, at 60°

714. TO SILVER COPPER OR BRASS, *referred to 700, at 616.*—Precipitate silver from its solution in aquafortis (186) by copper, as shewn at 616, and to half an ounce of this silver, add common salt, and muriate of ammonia, (664) of each two ounces, and one drachm of the muriate of mercury, (see 652), rub them together, and make them into a paste with water. With this *paste* copper utensils of every kind, after having been boiled in tartar and alum, are to be rubbed, and afterwards made red-hot and polished. They will then be beautifully coated with silver, and have the appearance of perfect silver. *For another process, (see 616).*

715. TO MAKE A SOLUTION OF DE-OXYDIZED INDIGO, BEING THE DYER'S BLUE VAT, *referred to at 704.*—Take three parts of proto-sulphate of iron, (8), and about the same quantity of hydrate of lime (slaked lime) and mix the whole together, with about 2 parts of indigo, and let it be stirred frequently for 12 hours, and the *Dyer's Blue Vat,* of de-oxydized indigo will have been prepared.

716. TO DYE INDIGO BLUE.—Dip a piece of calico in the dyer's blue vat, (715), and it will come out green, but expose it to the air, and it will assume a permanent blue.

717.—SULPHATE OF AMMONIA, *referred to at 705.*—I must here allude to a serious mistake of my printer, he having introduced a number of articles which are all out of place, being some of my manuscript that had got amissing, but which he unfortunately (being out of matter for No. 20) introduced to complete the number. The sulphate of ammonia is sometimes called heptized antimony, it is the most sensible test for lead, arsenic, antimony, &c. With lead it forms a black, with arsenic a yellow, and with antimony a deep orange, called Kermes's mineral.

718. TO PREPARE SULPHATE OF AMMONIA.—Introduce into the receivers *b, c, d,* of Woulfe's apparatus (see fig. article 378) a quantity of the watery solution of ammoniacal gas, what is commonly called *water of ammonia,* and put into the retort *a,* the materials for preparing *sulphuretted hydrogen gas,* (46) and proceed

as there directed, and the gas will be evolved passing out of the *retort*, and will be condensed and absorbed by the ammonia in the receivers, forming sulphate of ammonia, which has a yellow colour and a strong smell of sulphuretted hydrogen, resembling rotten eggs.

719. TO PREPARE CONJURER'S BALLS, *referred to at* 667.—The best are made by rolling pieces of linen neatly up in the form of balls, and afterwards blacking them at the flame of a candle or lamp. Sometimes these balls are made of cork.

720. SULPHATE OF ALUMINA.—By this I mean the common alum of commerce, which is not strictly speaking, sulphate of alumina, but sulphuric acid, alumina, and potassa. It is this salt that is referred to at 650, for mixing up in the composition for preserving birds, &c. It is of a sweet astringent taste of the specific gravity of 1.71. It dissolves in five parts of water at 60° but hot water dissolves about three-fourths of its weight.

721. To make the PYROPHORUS of HOMBERG.—To prepare this, take equal parts of powdered alum and brown sugar, and melt them over the fire, and keep stirring till the whole is reduced to dryness. The mixture, when cold, is to be finely powdered, and introduced into a common phial, coated with clay, to which a glass tube, open at each end, is to be luted, to allow the escape of the gases that are produced. The phial must then be set in the fire, surrounded by sand, in a crucible. Gas will issue from the open end of the tube, and may be inflamed by a lighted paper. When this *ceases to escape*, the crucible may be removed from the fire, and a little moist clay pressed down upon the open end of the tube, to prevent the *access of air* to the contents of the phial, and when cold, the tube may be removed, and a cork substituted in its place. The principal difficulty in the process is to stop it precisely at the period, when the pyrophorus is formed; for if the heat be continued longer, the preparation will be spoiled.

The pyrophorus thus formed is a black and light powder, which instantly takes fire when poured out of the bottle into the air, and inflames suddenly in oxygen gas. Sulphate of potassa appears to be essential to its production, and hence the sulphuret of potassa is a necessary ingredient. From the discoveries of Sir H. Davy, it appears very probable that this phyrophorus may contain sulphuret of potassium. The principle part of the phenomena, however, is owing to the combustion of an extremely light and finely divided charcoal.

722. Easy Method of dyeing Yellow or Green.—The plant called weld or dyer's wood, affords a most beautiful yellow dye for cotton, woollen, mohair, silk, and linen, and is that which is most commonly used by dyers for that purpose, as it gives the brightest dye. Blue cloths dipped in a decoction of it become green. The yellow colour of the paint called Dutch pink is got from this plant;

the tinging quality resides in the stems and branches, and it is cultivated in sandy soils, because rich soils are apt to lessen its value by making the stalk hollow.

723. SELF DECAPITATION, *or a new way of catching salmon.*—In the year 1800, a labourer dwelling near the town of Athy, county Kildare, was walking with his comrade up the banks of the Barrow, on whose meadow they were employed to mow; each having his scythe loosely wagging over his shoulder, and lazily lounging close to the bank of the river, they espied a salmon partly hid under the bank. It is the nature of this fish that, when his head is concealed, he fancies no one can see his tail (there are many wiseacres, besides the salmon, of the same way of thinking). On the present occasion the body of the fish was visible.

"Oh Ned—Ned dear!" said one of the mowers, "look at that big fellow there; isn't it a pity we ha'nt no spear?"

"May be," said Ned, "we could be after piking the lad with the scythe handle."

"True for you," said Dennis; "the spike of yeer handle is longer than mine; give the fellow a dig with it at any rate."

"Ay, will I," returned the other; "I'll give the lad a prod he'll never forget, any how."

The spike and their sport was all they thought of; but the *blade* of the scythe, which hung over Ned's shoulders, never came into the contemplation of either of them. Ned cautiously looked over the bank; the unconscious salmon lay snug, little imagining the conspiracy that had been formed against his tail.

"Now hit the lad smart!" said Dennis; "there now—there! rise your fist; now you have the boy; now Ned—success!"

Ned struck at the salmon with all his might and main, and that was not trifling. But whether the boy was piked or not never appeared—for poor Ned, bending his neck as he struck at the salmon, placed the vertebræ in the most convenient position for unfurnishing his shoulders—and his head came tumbling splash into the Barrow, to the utter astonishment of his comrade, who could not conceive how it could drop off so suddenly. But the next minute he had the consolation of seeing the head attended by one of his own ears, which had been most dexterously sliced off by the same blow which had beheaded his comrade.

The head and ear went down the river in company, and were picked up with extreme horror at the mill-dam, by one of the miller's men.

"Who the devil does this head belong to?" exclaimed the miller.

"Whoever owned it," said the man, "had three ears, at any rate."

A search being now made, Ned's headless body was discovered lying half over the bank, and Dennis was found recumbent by its side in a swoon, through fright and loss of blood. Dennis, when brought to himself, (which process was effected by whisky) recited the whole adventure. The head being tied up, the body was attended to the grave by a numerous assemblage of Ned's countrymen! and the habit of carrying scythes carelessly, has since very much declined.

724. THE PACIFICATOR, *a new power discovered by a person named* JOPLIS.—Says he, "I have devised and constructed a machine, by the aid of which two men can do the work of a thousand; nay, immeasurably more, since any two men being secure, are permanent forces, and can stand with certainty to their work for any length of time, whilst the thousand make up a perishable quantity, which is incessantly melting down to nothing, under the operation of the labours of their rivals. By my invention, instead of a thousand balls being thrown by a thousand men at intervals and at random, the machine can throw a continuous stream of balls of more than a thousand in the time occupied by the thousand men, and that steadily guided to its object under the cool deliberate aim of one imperturbed, unflinching eye. And the action of the machine is such, that, when the range is once got, the stream of balls must sweep the whole opposing line, through quite as long a stretch as the volley from a regiment; whilst as the gun is swung at pleasure backwards and forwards in a horizontal line during the discharge, the stream will continue to mow down a column as fast as the men advance. The gun, when necessary, will, with equal ease, traverse all round, so as to meet an assailant on every point of the compass. The facility of directing the gun is greater, and by mechanical arrangement, far more certain and precise, than is the guidance of the pipe of a fire engine, whilst the stream of balls which it delivers is analogous to the stream of water from the latter. The action of the gun can be maintained with momentary intermission for the renewal of the charge, so long as it may be required for the purpose of cooling down the glowing zeal of heroism to zero. Besides this immense superiority in the amount and precision of delivery possessed by the machine, every artist in the line of murder will, at a glance, recognise the advantage given to the new workmen by the consciousness of security afforded to themselves under an impenetrable shelter, whereby they can possess their faculties undisturbed, their energies unparalyzed, and can pursue their avocation cooly, and execute their business in a workmanlike way. This advantage alone is immense over the hurry-skurry, hand-over-head mode of working by hand-labour in the old way of conducting mutual murder. Again, a thousand men, or a regiment, can only transport itself slowly, or be transported somewhat more quickly by a great paraphernalia of equipage; my machine can fly with its two workmen to its place of need, with all the rapidity which horses can accomplish; and when at work, can be run about in any direction by its two workmen.

"There appear to be two cases in which my improved system of warfare, with mechanical auxiliaries, in substitution of human labour, may be expected to be adopted. One, where my machine would become a deadly weapon of offence; the other where it would prove an efficient instrument of defence; as it might come to be used against an unarmed or an armed multitude. In one case, a people, the peaceful inhabitants, the very untrained peasantry of an assailed country, with my engine for their ally, might mow down an invading army, without having a single soldier to succour them; and there its commanding energies would be called forth in a sacred cause; they would vindicate the universal right of self-defence; they would arrange themselves on the side of immutable justice; for, in the corrupted policy of governments, an assailed people is ever the weaker, and the injured party. The national independence of the smallest canton is based on a right as holy, as indefeasible, as is that of personal liberty; and the lawless assailants of it place themselves in the predicament of night burglars, whose lives are justly forfeited in their nefarious act. In the other case, it might be imagined that the exterminating powers of this engine could be turned upon an unarmed mass of men—that a government might direct the weapon against its own people; the bare supposition is monstrous—the act would be the damnation of the doers, and would sign the decree of their own immediate destruction. Whatever may be said to the contrary by those having an interest in the propagation of delusion, men never rise in tumult against the reign of equal laws, nor plot treason and sedition under the sway of justice and intelligence. Wherever, therefore, insubordination shews itself, it points to public wrong done, and testifies to some iniquity in the existing system of rule.

"To suppose that my machine will enter into the equipment of armies designedly opposed to each other, as under the past and present absurd and wicked system, is not to appreciate rightly the character of the invention. Its peculiar design is to give an insignificant number of men the power of annihilating congregated masses, however armed; to lift the politically feeble to a level with the strong; to guard the independence of the smallest state; and to curb the insolence of wanton military aggression. Armies have ever been collected by interested men for selfish objects, through every art of delusion which craft could practise on ignorance, prejudice, and passion; no delusion, no false excitement will suffice to draw men together to meet inevitable death. I have, therefore, from the inevitable consequences of its stupendous powers of destruction, called my machine—The Pacificator."

I feel much pleasure in giving a place in the Experimentalist to this notice of Joplis's *new power*, and I think the toiling masses of *democrats* are not worthy of a better condition, if they do not at once contribute towards a general fund, and secure the advantages of this discovery for themselves. I think it should be called the Universal Emancipator.

725. To take Impressions on Paper from Designs made on Stone.—The stone should be close grained, and the drawing or writing should be made with a pen dipped in ink formed of a solution of lac, in leys of pure soda, to which should be added some soap and lamp black for colouring; leave it to harden for a few days, then take impressions in the following manner:—Dip the surface in water, then dab it with printer's ink and printer's balls; the ink sticks to the design and not to the stone, and the impression may be taken with wet paper by means of a rolling or screw press, in the ordinary manner. Several hundred copies may be taken from the same design in this simple manner.

726. TRANSPARENT PAPER.—Wet some fine paper with a fine layer of rosin dissolved in spirits of wine. It will then servto put over any thing you wish to take off.

727. Substitute for Galls in Dyeing, and also in making Ink.—The excrescences on the roots of young oaks may be used with advantage as a substitute for galls. Oak dust has been used in this country instead of galls to produce a black dye; so also has a strong decoction of logwood, copperas, and gum Arabic.

728. TO SILVER GLASS GLOBES.—Take two ounces of quicksilver, one ounce of bistmuth, of tin and lead, half an ounce of each: first bring the tin and lead to fusion, then put in the bistmuth; and when you perceive all in fusion, let it stand till almost cold, and then pour in the quicksilver.

After this, take the glass globe, which must be very clean, and the inside free from dust; make a paper funnel, which put in the hole of the globe, as near the glass as you can, so that the amalgam when you pour it in, may not splash and spot the glass: pour it in softly, and move it about, that the amalagm may touch every where, if you find it begin to be curdly, hold it over a gentle heat, and it will flow again; the cleaner and finer your globe is, the looking-glass will be the better.

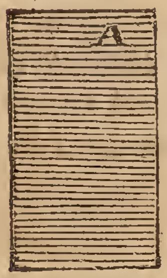
729. To make portable Glue, (commonly known by the name of Bank Note Cement).—Take half a pound of the best glue; boil and strain it very clear; boil two ounces of isinglass; and put them into a double glue pot, with a quarter of a pound of fine brown sugar, and boil it pretty thick; then pour it into plates or moulds; when cold, you may cut and dry them in small pieces for the pocket.

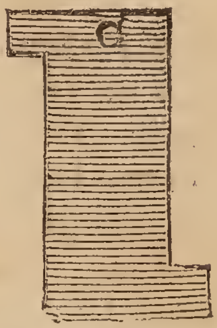
730. LIGHT FROM SUGAR.—If two pieces of loaf sugar, (about a pound each) be struck against each other in the dark, a light blue flame like lightning, will be elucited.

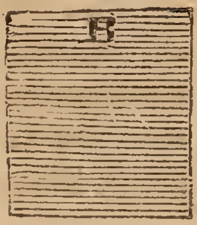
THE PUZZLER.

731. A parallelogram, consisting of a square and a half square, must be formed of card or paper, and by one cut divided into two pieces, which when joined shall form an exact square. Mind in this ingenious experiment there is no doubling up of the paper.

732. A paralellogram (A) may be cut into two pieces, which shall form the two figures B and C. It need scarcely be added, that whatever may be the dimen-sions of the piece A, the pieces B and C will bear the same proportion to it as they do in this figure.







CONUNDRUM.

733. What did ADAM set first in the garden of Eden?

734. THE SENTINEL EGG.—Lay a looking-glass upon an even table. Take a fresh egg, and shake it for some time, so that the yolk may be broken and mixed up with the white; you may then with a steady hand balance it on its point, and make it stand on glass. It would be impossible to make it stand *so*, while in its natural state.

735. THE EGG IN THE PHIAL.—To make an egg enter a phial without breaking, steep your egg in strong vinegar, and in process of time the vinegar will so soften the shell, that it will extend lengthwise without breaking, it may then be introduced into the phial, and when cold water is poured upon it, it will re-assume former figure and hardness.

To Correspondents.—"J. P." will be answered in next number. "J. H." there has not been room in this number for the valuable receipt on ginger cordial, but it will be enrolled first opportunity. "Novice" is informed that the steel must be cold when the grease and clay is applied; and the expressed juice of common beans in a green state is certainly meant. "H. M. C. Havannah-street," has been received, and will be enquired after.

Stuart's Useful Information for the People, No. 34,

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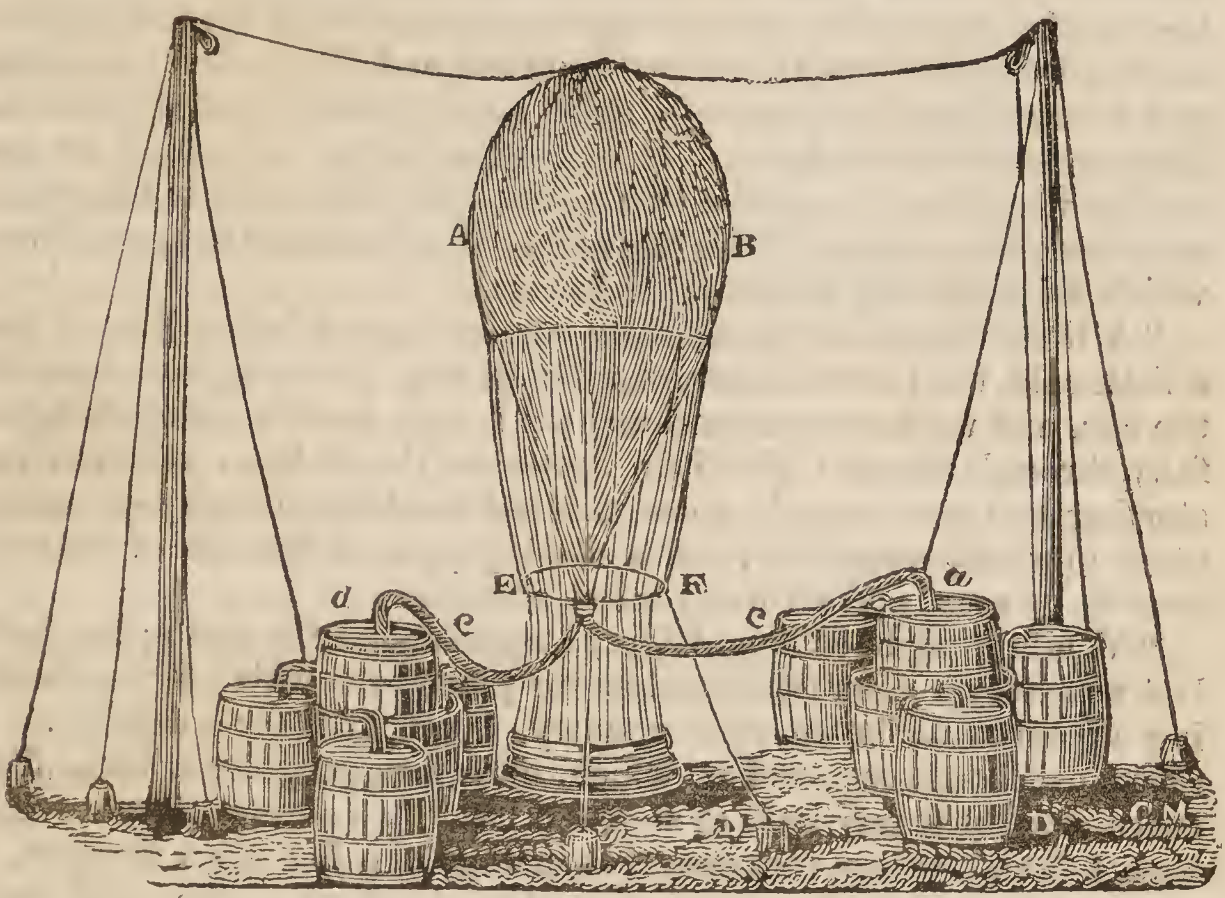
735. MANNER OF FILLING BALLOONS.



736. Description of the Management of the Balloon-filling, Gas-preparing Apparatus, (735).—Into each of the little kegs, *c*, put the ingredients for preparing hydrogen gas, (see 4, 5), and let a tube passing from the top of each of these little *kegs* convey the gas as it is formed into the *casks, a a,* which casks are open at the bottom, and stand with their bottomless ends downwards in another tub, but supported by three or four pieces of wood, to prevent them from resting close on the bottom of that tub, in order that there may be room between the inverted edge of the casks, *a, a,* and they containing tubs for the introduction of the tubes from the kegs *c,* to pass in beneath, the balloon being now collapsed and suspended as seen in the figure by pulleys, and the casks *a, a,* inverted and full of water, with the connecting tubes from the keys, *c,* passing beneath, and these keys being charged with the acid, iron and water, as before directed, the gas will be rapidly evolved, and passing into the receivers, *a, a,* will thence be transmitted by the tubes, *c, c,* into the balloon, A, B, which would at once ascend into the air,

were it not detained by weights attached to the netting, as seen at F. E.

737. Extraordinary Balloon Excursion in America.—On the afternoon of the 8th of April last, Mr. Clayton, a volunteer aeronaut in the West, made an ascent from Cincinnati, and was observed to pass in a south-easterly direction. Nothing was heard or seen of him for a number of days, and great anxiety was felt for his safety. At length, on the 17th, (nine days after his departure,) he returned to Cincinnati, having made the most extraordinary aeronautic excursion on record. He did not, indeed, ascend so high as a number have done before him; but the distance he sailed is beyond all precedent, being not less than three hundred and fifty miles! All this was accomplished in nine and a half hours, which is at the rate of thirty-seven miles an hour. The greatest height to which he ascended was about two and a half miles. Mr. Clayton has furnished an interesting account of his voyage to the Cincinnati papers, from which we make the following extracts:—

"A little before six my altitude was two and a half miles; I felt a little cold, the thermometer stood at 23 deg. I sat myself down in the car, and took some refreshment. I was now moving delightfully through the air; the little agitation the balloon received on starting had now ceased; there was not the least rotatory or oscillatory motion perceptible; not a single ripple on the silk of the balloon to be seen, and all was perfect silence.

"While in sight of New River, I approached the earth; my ballast was nearly exhausted, and as the place over which I was floating appeared to be an open country, I prepared for a descent. I threw overboard my anchor, which, after dragging for a little distance, caught firmly hold of a tree; but, on coming close to the tops, I found, to my surprise, that instead of a fine open country, I was in a dense forest, on a considerable elevation. The wind was blowing powerfully, and finding it impossible to break the hold of the anchor, the only way of liberating myself in this situation was to cut away the cable. This I did, and in a short time ascended to an altitude as great as I had previously attained. The cold was intense, but I could not ascertain the height of the thermometer; I have no doubt it was nearly as low as Zero. I had now lost sight of the water courses, and could see no lights in any direction. I laid myself down at the bottom of the car, buttoned my coat tight around me, put on my gloves, covered myself with two blankets which I had taken as wrappers for the balloon, drank some brandy, felt comfortable, and highly delighted with my novel trip, and in this situation fell fast asleep. I was awakened at last by my car striking. I immediately sprung on my feet, and in another moment the car was dragging over the tops of the trees. I saw before me a river, and I thought some buildings; they appeared but a little distance from me; but I afterwards found they were about four miles off. I attempted to stop my balloon, by clinging to the branches of the trees. Several of them broke; but at last I caught hold of a strong bough, and by clinging with all my strength with one hand, and pulling the valve-rope with the other, I was enabled to draw my car down the tree several feet, and secure it by means of a rope. After being confident that I had secured the balloon, I looked at my watch, and found it to be half-past two o'clock. At this time of the morning I thought it would be useless to go in search of any assistance. I therefore remained in the car, forty feet at least from the ground, until day-break, and then descended to explore the wilderness in which I had landed. I could discover no trace of human footsteps—no mark of change produced by man. Numerous large trees had been levelled to the ground, but there was no mark of the woodman's axe upon them; they had evidently been uprooted by the hurricane. Perceiving that I was on a mountain, and that there was another point still higher, I ascended to the top of it, and perceived in the valley, and in the direction I had seen the river the previous evening, a cultivated spot. After traversing alongside a beautiful spring rivulet for about three miles, I found this spot, but had to travel two miles further to get assistance. We conveyed the balloon to the house of Mr. Joseph Graham, a respectable and intelligent farmer, with whom I remained three days before I could get a conveyance to return. During my stay at Mr. Graham's, I was visited by great numbers of people from the surrounding country. The spot on which I landed is the top of the mountain—three thousand feet, as indicated by the barometer, above the level of the sea, and is called Stephenson's Knob, or Stinson's Knob, near Keeney's Knob, Munroe County, Virginia, about four miles from Green Briar River, eighteen miles from Unioe, twenty miles from Louisburg, within sight of the Alleghany Mountains, and, according to the route I travelled in the balloon, 350 miles, but, according to the usual method of travelling, more than 400 miles, which distance I travelled in nine and a half hours. This voyage, I believe, has fulfilled the promise I made in my advertisement, and is the longest voyage, by far, ever performed in a balloon.

738. To Dye a FAST GREEN, *as communicated by James Hodge, Dalmuir.*—Boil one pound of American bark in six quarts of water for 15 minutes, then strain off the liquor through a cloth, add to the liquor one half pound of logwood chips, and two ounces of blue galls, boil all together half an hour, and when cold, add one half gill aquafortis, (see 155) killed with copper, then thicken with flour or gum.

739. Mordant for Purple to be dyed up with half Madder, and half Logwood.—Take one gallon of iron liquor, two ounces nitre, two ounces of cream of tartar, heated over a slow fire till it is dissolved, and when cold, add two quarts common red liquor, (see 800), and ten quarts of water. Before dying you must dung well, and wash well in warm water, and again wash in cold, and enter it cold. Give to a half cover, 15-16, 24 yards, eight ounces madder, eight ounces logwood, three or four ounces shumac, bring it up in two hours, and boil five minutes.

740. TO DYE A FAST STRAW COLOUR.—Steep your cloth in fair water, then put in some liquor of verdigris, (½ounce is sufficient for 24 yards, 15-16). Then dip into some *cold* liquor, and it is finished.

740. TO DYE A FAST SALMON COLOUR.—Take 10 lbs. of white sugar of lead, 3½ lbs. of alum, 1 lb. of warm lime, and dissolve all together; then reduce the liquor to *three* on the hydrometer, and *pad* through this. Then dung and cold-wash well, then enter into a copper, with three pounds of French madder for every ten lbs. of cloth, and bring up to 180° of heat, then draw and enter into a copper of warm water at 190°, winch *in this* well, and draw again, and enter into another copper of warm water with three pounds of soft soap to every 40 lbs. of cloth, winch *in this* two or three minutes, wash in cold water, and finish.

742. PAPER THAT WILL NOT BURN.—Dip a small sheet of paper in a strong solution of alum water, and when dry repeat the process two or three times, when as soon as it is dry, you may put it in the flame of a candle, and it will not burn.—T. H.

743. TO PREPARE NITRATE OF IRON, (*see* 574).—Take three measures of double strong nitric acid, and one of water, add both together, and let it be killed with old iron *hoops*, and beat the *hoops* before you put them *in*. The older you keep the liquor the better.—T. H.

744. TO MAKE MURIATE OF TIN.—Take any quantity of marine acid, (see 394), and let it be *killed* with feathered block tin, 2½ lbs. to every gallon.—T. H.

745. TO PREPARE NITRO-MURIATE OF TIN.—To three measures of muriatic acid, (394), add one measure of double strong aquafortis (see 184), put both into one vessel, and let the mixture be killed with feathered block tin, (see 462); to each gallon of the acid mixture, add 1¾ parts of the tin.—T. H.

746. TO PREPARE GOLD POWDER FOR GILDING.—Put into an earthen mortar some leaf gold with thick gum water, and grind the mixture till the gold is reduced; having done so, add a little warm water, and wash out the gum, and the gold will be left in an impalpable pulverized state.—T. H.

747. A FIRE AND WATERPROOF CEMENT FOR BROKEN VESSELS OF ALL KINDS.—To half a pint of milk, put an equal quantity of vinegar, in order to curdle it, then separate the curd from the whey, and mix the whey with the whites of four or five eggs, beating the whole well together; then sift in quick-lime and mix the whole till it has acquired the consistence of thick paste; this cement resists fire and water, and drys quickly.

748. *Receipt, No. 2, for Painters*——TO PREPARE VENETIAN RED FOR OIL COLOURS.—This red is merely a red native ochre of a

scarlet hue, it requires no other preparation than being ground in oil; it is an excellent standing colour.

749. *Receipt, No. 3, for Painters*—RED OCHRE.—This is merely the Oxford yellow ochre made red by calcination; it is sure to stand in either oil or water colour.

750. TO PREPARE EXCELLENT GINGER WINE, *(see another receipt* 637).—Put into a boiler ten gallons of water, fifteen pounds of lump-sugar, with the whites of six or eight eggs well beaten and strained; mix all well while cold; when the liquor boils, skim it well; put in half a pound of common white ginger bruised, and boil it twenty minutes. Have ready the very thin rinds of seven lemons, and pour the liquor on them; when cool, tun it with two spoonfuls of yeast; put a quart of the liquor to two ounces of isinglass shavings, while warm, whisk it well three or four times, and pour all together into the barrel. Next day stop it up; in three weeks bottle, and in three months it will be a delicious and refreshing liquor, and though very cool, perfectly safe.

751. *Referred to at* 645. HYDROGRAPHIC PAPER, *or white paper, which when wrote upon with a pen dipt in water, the writing will appear blue, as if wrote with blue ink.*—Soak sheets of paper in a solution of sulphate of iron, (see 8, page 4th), and dry them (as done at 646), then sift over it finely powdered ferro-cyanate of potassa, (577), and put it through a calender press, and it is complete.

752. GENERAL RULES FOR VARNISHING.—This is a point nicely to be observed, or your labour and cost may be in vain.

1. If you choose wood that requires to be varnished, let it be exempted from knots, very close grained, smooth, clean, well rushed and freed from greasiness.

2. As for your colours and blacks, lay them even, and exquisitely smooth, sweep all roughness off with your brush.

3. Keep your work very warm, but not so hot as to raise blisters, or crack it, which nothing but scraping off all the varnish can amend.

4. After every distinct wash let your work be thoroughly dry; for neglect in this point introduces the fault of roughness.

5. After it is varnished, let it lie by and rest as long as your convenience can admit, and it will be the better.

6. Ever take care to begin your varnish strokes in the middle of the table, or what you do it on, and not from one end to the other, your brush being planted in the middle, strike it to one end, then take it off and fix it to the place you began at, so draw or extend it to the other end, and so continue it till the whole be varnished over, and beware you overlap not the edges, which is when the varnish hangs in splashes or drops on them; therefore to prevent it, draw your brush gently once or twice against your gallypot side.

7. When you have proceeded so far as to come to polish, let your tripoli be very fine, and the finer the work, let it be still the finer, and use fine rags, keeping your hand moderately hard upon it, and brighten or polish one place as much as you intend, ere you leave it, and pass to another, and always have regard that you polish your work as smooth as you intend at one time, but if your conveniency will admit, let it rest two or three days before you give the finishing strokes after you have polished it, but come not too near the wood to make it thin and hungry, for then it will require another varnish, or remain to your discredit.

8. Take a sufficient quantity of tripoli at the first polishing, till it begins to come smooth, and so lessen by degrees, and carefully observe there be no scratches or grating in it.

9. When you have a mind to clear up the work, wash off the tripoli with a sponge, and soak up the wet with a fair linen cloth, and with lampblack mixed with oil, gently smear the whole face of it, let no corner nor moulding of it escape, that the whole piece may be freed; then with other linen, and a hard hand, cleanse it of that, and these things done, there will be an admirable gloss.

For white work, let your polish be gentle and easy, do it nimbly, and clear it with oil and fine flour; and in exactly observing these rules, you will prove an artist.

753. *Receipt, No.* 4, ON SUGAR BOILING. To MAKE WHAT IS COMMONLY CALLED PARADISE TWIST-STRIPPED ROCK, CLEAN AND GOOD AT 6d. A POUND.—Get some raw sugar, and boil it up for *black rock*, (620), according to the rule laid down at (597), then take a portion of the warm stock of sugar which is lying on the marble slab, fit for making *black rock*, and pull it over a nail or hook, as recommended at 712, when it will become light, porous, and white; with this lay it all along the soft mass for black rock lying on the stone, and double it backward and forward till it is stripped enough: then draw it out into long cords, and as it keeps cooling, keep rolling it till it is equa,l round, stripped, and beautifully variegated, season with a few drops of oil of peppermint, and you will thus have prepared good stripped pepperment rock. *To be continued.*

754. *Receipt, No.* 4, *for Painters*—PRUSSIAN BLUE.—This blue, (see 581), is a transparent colour, and may be used with either water or oil; where a body is required, it is mixed with white lead, (651) and when used in distemper colouring, it is mixed with whiting; it is usually kept in the colour shops under the name of *damp blue*, ready ground.

755. *Receipt, No.* 5, *for Painters*—YELLOW OCHRE.—This mineral earth is found principally at Shotover Hill, near Oxford, and is therefore called Oxford ochre, it suits for all kinds of painting, it is of a moderate bright yellow, and is used either as an opaque or transparent colour. There is a quarry of it at Newliston, parish of Kirkliston, 8 miles from Edinburgh, where cart loads of it may be had of excellent quality.

756. *Receipt, No. 6, for Painters*—KING'S YELLOW.—This yellow is merely the yellow sulphate of arsenic, generally termed orpiment, purified by sublimation. It may be used either with oil, varnish, or size, and is a bright opaque colour; it stands well of itself, but when mixed with any mineral colour, (for instance white lead), it instantly flies; with blue it forms a beautiful green.

757. *Receipt, No. 7, for Painters*—DUTCH PINK, YELLOW PINK.—Prepared by boiling together French berries, turmeric roots, and alum, and carrying down the colouring matter by carbonate of lime.

758. *Receipt, No. 8, for Painters*—VERDIGRIS.—This is the acetate of copper; it is of a blueish green, but becomes a true green by mixture with Dutch pink. King's yellow and verdigris destroy each other.

759. *Receipt, No. 9, for Painters.*—ORANGE is best produced by a mixture of red and yellow, according to the tint required.

760. *Receipt, No. 10, for Painters.*—PULPLE is produced by a mixture of red and blue.

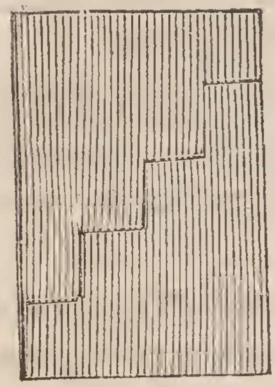
761. *Receipt, No. 11, for Painters.*—TO PREPARE DRYING OIL COMMON WORK.—Mix one pound and three quarters of red lead with an imperial gallon of linseed oil. Boil them together, and afterwards let the oil stand for a few days, for the lead to sink to the bottom.

762. *Receipt, No. 12, for Painters*—ANOTHER METHOD.—Take 1½ ounces of sulphate of zinc, and 6 ounces of litharge, pound them to a fine powder, and mix them with four English pounds of linseed oil, and let it boil very slowly in an iron pot, till the scum ceases to be thrown up by the heat; let it now stand to cool for 6 hours, then pour the clear oil into bottles, leaving the sediment at the bottom; let it stand in the bottles a week or two, and it will then be fit for use. (*See other methods and remarks*, 479, 480).

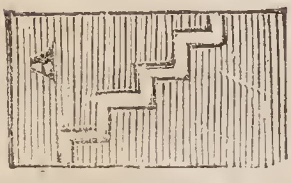
763. *Receipt, No. 13, for Painters*—OIL OF TURPENTINE.—This is an essential oil, distilled from *crude* turpentine, (commonly called white tar), after the distillation of which *rosin* is left in the *still.* If mixed with either fat, nut, linseed, or poppy oils, it causes them to dry much sooner than they otherwise would by flying off, and carrying with it the more volatile parts of such oil. *To be continued.*

764. *Receipt No. 3,*—ON GILDING AND SILVERING—TO PREPARE SIZE TO LAY GOLD LEAF ON FOR BURNISHING.—Take an equal quantity of the best French and English bole armoniac, grind these fine on a marble stone, with fair water, then scrape into the mixture a little candle grease, incorporate and grind the whole well together, then mix a little quantity of parchment size, (see 623) with a double proportion of water, and the size is made.

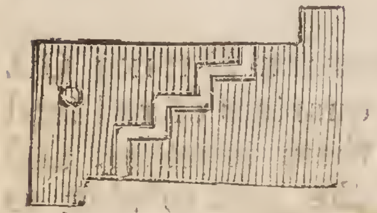
THE PUZZLER.



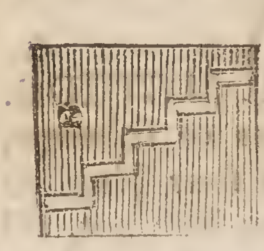
765. SOLUTION OF THE PUZZLER (731).—With a pair of compasses divide the longer side of the parallelogram into five parts, and the shorter side into four parts, then cut the whole into steps, as indicated in the annexed figure in the margin; the two halfs may then be put together, so as to form an exact square, by raising the lower half, and carrying it to the right one step.



766. SOLUTION OF 732.—Let the piece A, be divided into six divisions lengthways, and five in the breadth; then cut it in steps as seen in the figure in the margin, and it will then suit to form the two figures B. and C.



767. TO FORM THE FIGURE C, 732.—Carry the part A from the right one step towards the left, and the figure C, referred to 732 will be formed.



768. TO FORM THE FIGURE B, 732.—Lower the part A one step, and carry it to the right also one step, and the fig. B. (732) will be formed.

769. SOLUTION OF CONUNDRUM, 733.—His foot.

775. AN ARITHMETICAL PUZZLE.—To name five weights, which, when added together, shall make 121 pounds, and by means of which may be weighed every intermediate weight, excluding fractions.

770. CONUNDRUM.—What burns to keep a secret?

771. A CHEAP FILTER.—Buy a common earthenware funnel, and put a small piece of sponge at the top of the pipe inside, and over that a handful of clean gravel, then fill the funnel with water, and after passing through, it will come out as clear as crystal; thus you may have quite as good a filter for *fourpence* as can be procured for as many *pounds*.

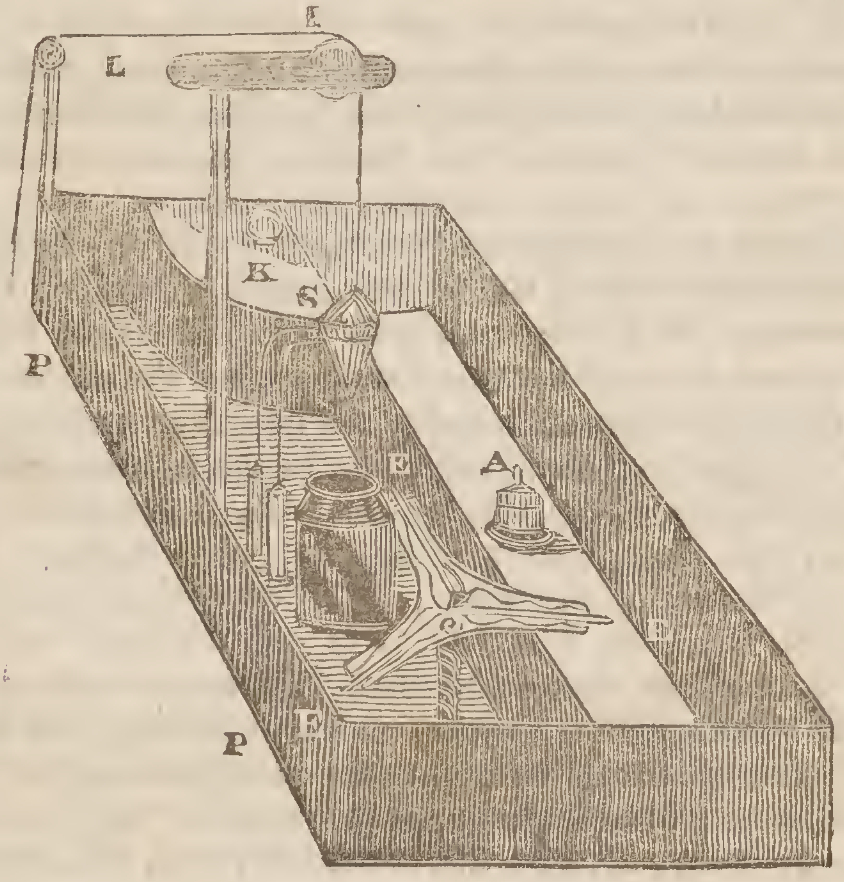
To Correspondents.—"A constant reader" has not read from the beginning, or he would have seen the varnish he enquires after at article 14. Subscribers to the Experimentalist who intend to complete the work, would do well to secure the early numbers, as they are already *getting scarce*.

Stuart's Useful Information for the People, No. 35,

Being No. 23, of the

CHEMICAL EXPERIMENTALIST.

792. PATENT INSTANTANEOUS LIGHT BOX, (see 794)



793. Striking Out—Learning to Swim, (see 815).

794. Description of the Fire-Box.—As the patent has now run out, it may not be out of place to give a description of this ingenious contrivance. In this apparatus, a metal (tinned iron) frame *c*, is fixed upon an upright axis, with a spiral-spring around it, and on the top of each of the three arms of this frame are small springs for holding the matches, E, E, they must be chlorate matches, (see how to prepare lucifer matches 263); this little frame is turned so that one of the matches may rest against the stopper S, when fitted in the bottle beneath. The spiral spring keeps the match gently pressed against the stopper, till the stopper is withdrawn by the

cord L, which passes over the pully I; it then becomes ignited by the sulphuric acid on the stopper, as it is in the act of being withdrawn; thus getting at liberty, it passes on to the spirit lamp, which it lights. The whole is the work of an instant, as the moment you raise the stopper by the pully. the match is lighted, and passes on to light the spirit-lamp A, while the stopper drops again into the mouth of the bottle, to be again charged with the sulphuric acid; and thus every time you drop in the stopper and withdraw it, a match is lighted.

795. FIRE.—The primitive mode of getting a fire was by rubbing two pieces of wood together, until the fine dust rubbed off was kindled from the heat produced by the friction, and such is still the mode in the smaller islands of the Pacific. In the Terra del Fuego, at the extremity of South America, the natives produce fire by briskly rubbing a piece of pyrites, (sulphuret of iron) against a flnty stone. The flint and steel, tinder and match, remained long to be the only resource of Europeans, and the nations of the civilized world, but chemistry within these few years has developed many different and facile processes, whereby this useful element may be generated. For instance, I shall refer you to the following paragraphs of the Experimentalist for illustration: 30, a fountain of fire; 33, a fire bottle; 55, phosphurett of sulphur, fire bottles; 110, 111, spontaneous inflamation of metals; 133, detonation and flame; 134, 135, 136, 137, 138, 139, 140, 141, 142, all different processes for producing detonations, flame and fire; 173, oxygen gas re-lights an extinguished candle; 174, oxygen gas sets fire to, and burns iron with a light so excessively brilliant that the eye could not look upon it: 177, 178, zinc and arsenic burns in oxygen; 203, instantaneous inflammation; 263, 264, 324, 367, 368, 369, 421, 721, are all modes whereby the chemist has the power of eliminating fire, in a sensible form from different bodies, which have in general every appearance but *that* of containing fire.

796. GERMAN TINDER.—The *boletus igmarius,* a sort of parasitical mushroom, is manufactured on the continent for tinder. This substance is cut in slices, and then soaked in a strong solution of saltpetre and dried; in which state it catches fire with the slightest spark. It is now much used by *smokers* in this country to light cigars, being more cleanly than common tinder.

797. *Receipt, No. 4, for farmers, farriers, and grooms*—HORSES, PREVENTATIVE REMEDY FOR CORNS, FOUNDER, &c.—Take *cow-dung,* and stuff the soles of the horse's feet full, but not too hard; it may be just thick enough to remain in its place, but if too much so, a solution of saltpetre may be employed; slips of thin wood, resembling *matches,* may be introduced to retain the stuffing in its proper place. Change twice a-day, always clearing away the old, before the new stuffing is introduced.

As an adjunct to this method, it is the practice to knead into the pavement, four pieces of clay, of 14 or 16 inches over, for him to stand upon, and the horse will shew his *sense* of the benefit he receives by his *manner*.

798. *Receipt No. 5, to farmers, farriers, and grooms.*—OF CROTON SEED AND ITS FARINA, AS A PURGATIVE FOR HORSES.—In the event of a person wishing to administer *croton farina* to his horses as a purgative, it is not advisable to purchase it ready prepared from the druggists, as the oil is generally extracted, and the farina adulterated into the bargain. It is best to keep the croton seeds beside yourself, and powder them when you want them, and you shall never be disappointed in their effects. *Three grains* is equal to *one drachm* of aloes; if too large a quantity be ground at a time, it will be injured, or probably spoiled.

799. VARNISH FOR GLASS.—Reduce a quantity of gum tragacanth to powder, and let it dissolve for twenty-four hours in the white of eggs well beat up; then rub it gently on the glass with a brush.

800. *Receipt, No. 14, for Painters*—TURPENTINE VARNISH.—Take five pounds of rosin, powder it, and put it into one gallon of oil of turpentine, boil the mixture over a stove, till the rosin is perfectly dissolved, and when it is cool, it will be fit for use.

801. *Receipt, No. 15, for Painters*—TO PREPARE VARNISH.—Add four ounces of rosin for every pound of lintseed oil, and boil for an hour, letting the rosin be well powdered before adding the oil, and keep it stirring all the time it is on the fire till it is dissolved. When the solution is complete, add one ounce of spirits of turpentine for every pound of oil; strain and cool.

802. *Receipt No. 16, for Painters.*—PAINTER'S CREAM.—Take one ounce of gum-mastic, powder it finely, and dissolve it over a gentle fire, in six ounces of nut-oil. Then pour the mixture into a marble mortar, with a quarter of an ounce of acetate of lead (703) powdered, stir with a wooden pestle, and keep adding water in small quantities, till the whole assume the appearance and thickness of cream, and refuses to admit and mix up with more water *freely*.

Note. This preparation is employed by painters, to cover unfinished work, and preserve the freshness of the colour, when they are obliged to leave it, as it can be easily removed when they return.

803. *Receipt No. 4, on Gilding and Silvering.*—TO PREPARE GOLD SIZE TO GILD WOOD IN OIL.—Grind red-lead with the thickest drying oil you can get, the older the better before using it, and bring it down to a proper consistence for working with oil of turpentine.

Note. If the size is good, it will be dry enough to lay the gold on in twelve hours.

804. *Receipt No 5, on Gilding and Silvering.*—To Gild Wood in Oil.—When the wood is well primed and quite dry, (see 619), lay a thin coat of gold size (as above) upon it, and when it is dry enough, having your gold-leaf spread upon a cushion, cut it in strips of the proper size, by a blunt palette-knife; then taking the stripes on the point of a brush, lay them on, and press them down with a ball of soft cotton, and wipe away the loose particles with a camel's hair brush, and it is gilt.

805. PRINTER'S INK.—Boil lintseed oil in a large iron pot for eight hours, and add to it bits of *toasted bread*, to absorb the water contained in the oil, let it rest over night, and boil it eight hours more, or till it has acquired a proper consistence; then add lamp-black, and work up into ink with crude turpentine, and oil of turpentine.

806. TO PREPARE COURT PLASTER.—Soak isinglass in warm water for twenty-four hours, and when the water is nearly dissipated, supply its place by spirit of wine, strain the whole through a piece of thin muslin, and see that when cold it have the consistency of a tremulous jelly. Now extend *black silk* upon a wooden frame, then liquify the isinglass by heat, and apply it to the silk with a fine badger's-hair brush; it drys quickly; repeat the coats till two or three; and lastly, when dry, give it two or three coats of balsam of Peru. *This is genuine court plaster, it is pliable and never breaks, and is far superior to the spurious articles generally sold under that name, which are generally made with commow glue.*

807. To imitate Tortoise-Shell.—Mix equal quantities of quick lime, red-lead, and strong soap lee together, and lay it on the horn with a small brush, in imitation of the mottle of tortoise shell; dry, and repeat it two or three times.

808. Another way to imitate Tortoise-Shell.—Take a piece of nitrate of silver, and grind it on a stone with gum water and red lead, proceed with this as in last experiment, and the horn will be stained quite through, when it may be polished.

809. To clean old silver, and make it appear just like new.—Lay the silver upon a charcoal fire, and when just red, take it off and boil in tartar and water, and the silver will have the same beauty as when new.

810. *Receipt No. 6, on Gilding and Silvering*—To gild Glass and Porcelain.—Take copal or amber varnish, and apply it very thin to the parts intended to be gilt, in about twenty-four hours place it in a stove till it be so hot as almost to burn the fingers; now apply leaf gold; sweep off the superflous leaf, and when cold, burnish with a piece of Indian paper interposed.

811. *Receipt No. 7, on Gilding and Silvering*—BOOKBINDERS' RECEIPT—To GILD LEATHER.—First dust over the leather with fine powdered rosin or gum mastich; heat your tool at a clear fire, and try its heat by imprinting its mark on the raw side of a piece of waste leather; if the heat is proper, press the tool downwards on the leaf gold, and a gilt figure will be indented.

812. BOOKBINDERS' RECEIPT, *being Receipt No.* 8, *on Gilding and Silvering*—To GILD THE EDGES OF PAPER.—Screw the edges of the leaves horizontally and tight in a press. Let them be cut as smooth as possible; burnish and size them with isinglass-glue mixed with spirit of wine, and then apply the gold leaves; when dry, burnish with a piece of agate, fixed in a handle.

813. BALLOON VARNISH.—Take a pint of boiled lintseed oil, and add to it a pound of bird-lime, in an iron or copper vessel, and boil all gently over a charcoal fire, till the bird-lime ceases to crackle; then pour upon it two pints and a half of drying oil, and boil till when rubbed between two knives, and again separating them, the varnish forms threads between them.

314. *Article 1st, on the Art of Swimming*—ON ENTERING THE WATER.—Be not too venturesome at first. Previous to entering the water, let the head and neck be well wetted, and choose of a shelving bank in some clear stream, and ascertain the depth by a plumb or otherwise, before venturing in. If there is any part in the immediate neighbourhood deeper than your breast, it will be improper to make your first attempt at swimming there, but search for a place where, at its deepest, is just breast high; here it will be safe to make the first essay by swimming from the centre towards the bank.

815. *Article 2nd on the Art of Swimming.*—STRIKING OUT.—With the face turned towards the bank, as recommended last article. Lie down gently on your breast, keep your *head* and *neck* upright, your *breast* advanced, and your *back* bent inward. Then draw your legs from the bottom, and immediately strike them out behind, (not downwards). Strike out the arms forward with the palms closed, and the backs uppermost, and just a little below the surface of the water, and thus with hands and feet *alternately* push forward. Be not discouraged although you should swallow a little water, as all new beginners accidentally do so, but recollect that the water at deepest reaches but your breast. *To be continued.*

816. *Receipt No. 7, for Shoemakers*—TO MAKE BLACKING HEEL BALL.—Take of mutton suet four ounces, bees' wax one ounce, sugar candy and gum arabic one dracham of each; let the gum and candy be powdered; melt them well together over a gentle fire, and add thereto about a spoonful of turpentine, and ivory or lamp-black sufficient to give it a good black, then pour it into moulds, or

when it is nearly cold, it may be formed by the hand into what shape you please.—J. H.

817. To Produce Fire from a Cane.—Split a chinese *rattan*, and when perfectly dry, strike the parts together, and they will emit fire like a flint and steel.

818. To dye Silk a Purple Colour.—Take one pound of cuthbear, and four ounces of pearl ash, and mix them together, and put them on a gentle fire, and boil 24 yards of silk cloth therein for half an hour, then take it out, and rinze in cold water, and it is done.—J. H.

819. TO DYE A FRENCH WHITE.—Proceed just as in last experiment, but boil one hour and a half, according to the time you boil, you change the shade.—J. H.

820. *Receipt No.* 2, *for Masons*—General proportions of the London Builders' Mortar,

Lime, ...	1½ cwt.
Sand, ...	2½ loads.

Note. If the lime be well burned, it will take more sand, viz. 2 parts of sand to one of unslacked lime; and farther, the more the mortar is beaten, the less time will suffice.

821. *Receipt No.* 3, *for Masons*—Dr. HIGGINS' MORTAR,

Lime newly slacked, ...	1 part.
Fine sand, ...	3 parts.
Course sand, ...	4 parts.

822. *Receipt No.* 5, *for Confectioners*—To boil Sugar to what is called by Confectioners the Feathered Height.—Proceed as directed at article 597, but instead of trying it with a pipe shank, as there recommended, merely dip a spoon in the boiling sugar in the pan, and after having shook the greater part back into the pan, give a flirt with the spoon, and if it fly off with the appearance of feathers, it is done. Or if, when taking a little of it between the finger and thumb, and extending them, the sugar-syrup form a thready or ropy consistence between them, which breaks, and retracts like a small drop towards the thumb, it is done. Or if, when trying with a pipe, as in 579, it does not break, but bends and retains its form.

823. *Receipt No.* 6, *for Confectioners*—To prepare beautiful Transparent Pepperment Tablet.—Put one pound of loaf sugar into a clean tin pan, and pour on it one gill of water, let it dissolve the sugar, and boil on a slow fire, till it has attained the feathered height spoken of last article; then take the back of your spoon, and rub the thick ropy syrup between its back and the side of the pan; if, in rubbing, it become white and sugary, it is well enough boiled, but if it does not, it is not boiled enough. In the event of its being

well enough boiled, or candies between the spoon or sides of the pan, continue to rub and candy the sugar, and always after having candied a little, rub it down from the sides amongst the uncandied syrup, till the whole begins to assume a whitish sugary appearance. Now have a sheet of clean writing paper anointed on one side with sweet butter, (not salt) and having dropped into the pan twenty or thirty drops of oil of *peppermint*, stir it round and pour out on the buttered side of the paper, and when cold, it will be beautifully white, variegated, and transparent tablet. *To be continued.*

824. *Receipt No.* 1, *for Snuff-takers*—To PERFUME SNUFF WITH FLOWERS.—The flowers most used in this, are jessamine, orange, musk roses, common roses, tuberoses, &c. but these, if used naturally, must be helped with the essence of other flowers, or the same; to do this, get a wooden box large enough for your purpose, lined within with dry white paper, lay a laying of snuff and a laying of flowers, and let them stand twenty-four hours, then search or sift the snuff, to take out the flowers, and renew them with other flowers; continue it four or five days, then separate it, and keep it in close boxes in a dry place for use.

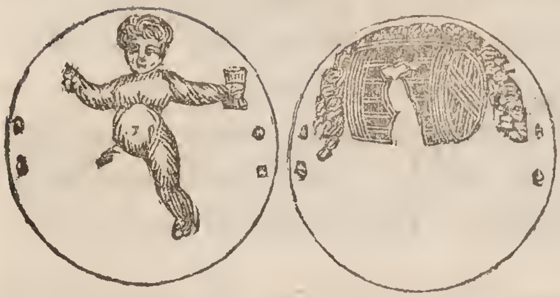
825. THE EXTRACT OF ZINC, THAT CLEANS PLATE, AND RESTORES PLATED GOODS TO THEIR FIRST LUSTRE.—Take an ounce of zinc, (good pewter will do); melt it in an iron ladle; then add one ounce of quicksilver; stir them together on the fire, with a knife or spatula, till a brown scum appears; then pour it on a paper, rub it with a knife or spatula till cold, and when dry add one ounce of rose pink, and one pound of Spanish whiting; mix them well together; rub it on the silver or plated goods with spirits of wine, and polish with a piece of soft leather.

Goldsmith's dust is an excellent thing for all silver, gold, and plated goods; it may be procured at the goldsmith's or silversmith's at one shilling the box, which will last for several years. Rub the powder on with a piece of soft leather, and they will always look as good as new. The plate should previously be washed with soap and water.

826. THE OXYGENATED ACID GAS, THAT EXTRACTS ALL STAINS.—Take half a pint of water, dissolve it in half an ounce of salt of sorrel; and two ounces of spirits of wine; then shake them well together, and rub the liquid on the stain with a sponge; wash the parts afterward with water, and the stain will disappear.

827 A LIQUID THAT POLISHES MAHOGANY TO THE HIGHEST PITCH OF PERFECTION.—Take two ounces of bees' wax, and half an ounce of alkanet root; melt them together in an earthen pipkin or pot; when melted, take it off the fire, and add two ounces of spirits of wine, and half a pint of linseed oil. Rub it on, and polish with a clean woolen cloth.

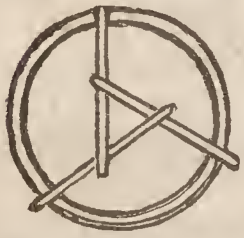
THE PUZZLER.



828. The Turn Wonder.—This amusing toy is an affection of the eye, and is made and exhibited as follows; Cut out a small circular piece of card, to to which fasten four strings as in the engraving. Draw on one side of it a Bacchus, and on the other a butt, as represented. Then take one of the strings between the forefinger and thumb of each hand close to the card, and twist or twirl it rapidly round, and according to which pair of strings you use, the figure will be seen in a different position. Various divices may be used; for instance, a bird on one side, and a cage on the other; a tight rope and a dancer; a body and a head; a candle and a flame; a picture and a frame, &c.

829. Solution of the Arithmetical Puzzle, page 176.—The five weights, which, when added together, make 121, and by means of which may be weighed any intermediate weight, are 1, 3, 9, 27, 81-121.

830. Solution of Conundrum, page 176.—Sealing wax.



831. THE FLAT ROOF PUZZLE.—The annexed figure explains a most ingenious device for forming flat roofs, or floors, of pieces of timber little more than half the length of such floor or roof. This plan is well known to architects; the way in which a young person may be amused with this puzzle, is as follows: Suppose a common basin to be six inches in diameter, it may be roofed over, as in the figure, with three slips of wood, &c., although these slips shall very little exceed half the diameter of the basin, say half an inch longer. In performing this puzzle, let the slips of wood be thin, *like matches*, or they will not lap over each other, so as to form a flat roof.

332. Why is a bad *wife* better than a good one?

833. What makes *all* women alike?

834. Which is the *left* side of a plum-pudding?

835. A Simple Mode to clean Silk.—Take some æther, wash the soiled part, and the grease will soon disappear.

Subscribers for this work are again reminded to supply themselves immediately with any number they may want to complete their series, as many of the early numbers are getting out of print. Cowcaddens correspondent has been received.

Stuart's Useful Information for the People, No. 36,

Being No. 24, of the

CHEMICAL EXPERIMENTALIST.

836. SWIMMING BY THE ROPE.

837. FLAYING ESTABLISHMENT AT MONTFAUCON.—This is probably the most curious example in the world of the manner in which materials, which are commonly thrown away, and scarcely even pay the cost of removing them, may be turned to profit. There are, no doubt, many other substances as well as the bones, flesh, and entrails of dead horses, which are daily allowed to run to waste in great quantities, and which, in like manner, under judicious and systematic management, and by the application of processes familiar to the present advanced state of the arts, might be saved and converted to important uses. The present account may serve as an illustration and indication of how this might be done. The principal establishments of this kind are the two at Montfaucon, on the high ground to the north of Paris, where the business is confined to the flaying and profitable preservation of the parts of dead horses. One of these establishments belong to a M. Dussaussais, and the other to a company. Some of the horses are dead when they are received, others are brought to be killed on the spot. They then undergo the following processes:—The hair of the mane and tail is cut off. As, however, the long hair used for weaving of cloth is commonly wanting, the produce is but small, and will barely exceed a quarter of a pound of horse hair, a pound of which is sold for about 5d. English. The produce of one horse, in this particular, is therefore about 1d. The skin is now taken off, laid together, and sold to the tanners in the neighbourhood; it weighs in general, about sixty pounds, and sells for from 9s. to 12s. English.

The shoes are taken off, and sold as horse-shoes, if still good enough, or if not, as old iron. The nails, likewise, are collected and sold, more particularly in the provincial towns. The profit from this source is about 2d. per horse. The feet are cut off, dried, and then beaten on a hard surface, in order to detach the hoofs; or, in winter, they are left in heaps to putrify, until the hoofs become loose. The hoofs are sold to turners, comb-makers, and manufacturers of sal ammoniac and Prussian blue, who pay for them, if they are rasped, about 1s. 5d. The fat is very carefully collected. First, that upon and between the muscles is separated; then the muscles are laid single on the table, and every bit of fat picked out; and finally that of the entrails is detached. The collected fat is cut into small pieces and melted. Horse fat is used for burning in a flame, by enamellers and glass-toy makers; it is also used to grease harness, shoe-leather, &c. Soap is manufactured from it, and it produces gas for lighting. The pound is sold for fivepence three farthings. A horse yields, on an average, eight pounds, worth about 4s.; well fed horses will yield, however, as much almost as sixty pounds, bringing, therefore, nearly 30s. The flesh is used for food by the workmen, who choose the best pieces for themselves, and leave the rest to dogs, cats, hogs, and poultry. The flesh is used likewise as manure, and in the manufacture of Prussian blue. A horse has from three to four hundred pounds of flesh, which yields in this way a profit of from 30s. to 40s. The sinews or tendons being separated from the muscles, the smaller ones are sold fresh to the glue makers, and the larger dried and disposed of in great quantities for the same purpose. A horse yields about one pound of dried tendons, worth 2¼d. Of the bones, three hundred and fifty thousand pounds are annually sold; the remainder serves for fuel, and chiefly for melting the fat. A considerable quantity is sold to cutlers, fan-makers, and other workmen who use bones; but more to the manufacturers of sal-ammoniac and ivory black. The pound of bones sells for about ¼d.; and as a single horse produces ninety pounds of bones, the profit is about 1s. 11d.; the small guts are wrought into coarse string for lathes, &c. The other entrails are piled up and sold in a state of putrefaction as manure. A two-horse load brings from 4s. 6d. to 9s. Even the maggots, which breed in great numbers in the putrid refuse, are not lost. Small pieces of flesh and entrails, to the height of about half a foot, and slightly covered with straw, are piled up in the sun. The flies, attracted immediately, deposit their eggs in these, and in a few days' time the whole becomes a living mass, the putrifying substance being reduced to a very small quantity. The maggots are sold by measure, partly as baits for fishing, but chiefly as food for fowls and pheasants. The entrails of a single horse generate these maggots in such plenty as to yield a profit of nearly 1s. 6d. The rats of Montfaucon play a part eqully important. As these animals find here abundance of food, and the females bring forth every year from twelve to eighteen young, there is an innumerble host of them in the place. Sixteen thousand have been killed in four weeks in the same room, without any decrease being perceived; they undermine the walls, so that the buildings give way, and can be secured only by surrounding the foundations with broken glass. The whole neighbourhood has been excavated by them to such a degree, that the ground shakes beneath your feet. They are caught by placing the fresh carcase of a horse alone in an apartment, the walls of which have openings at the bottom. The next morning these holes are stopped, and all the rats are killed; their skins are then sold at 3s. per hundred. In this manner, the various parts of a dead horse, converted into articles of trade and consumption, yield, according to a calculation that has been made, when of middling quality, £2 13s. and when very superior, nearly £5. A dead horse is bought at first for from 9s. to 13s. 5d.; to which add from 4s. 5d. to 6s. as wages for the collector and labourers, still there remains a profit of about 36s. to an establishment. According to the statement of M. Parent Duchatelet, there are thirty-five horses on an average every day, or twelve thousand seven hundred and seventy-five every year, brought to Montfaucon from Paris and the surrounding neighbourhood; this altogether affords a profit of about £23,000 sterling.

838. Permanent Ink, that no Art can Extract.—Take a bit of lunar caustic; put it into the end of a quill; cut it to a point; damp any thing you wish to write or mark on. Keep the caustic in a bottle.

839. A Liquid that prevents Polished Steel from Rust.—Take an ounce of the oil of almonds; add to it half an ounce of camphore; put the bottle near the fire to dissolve the camphore, then rub it on steel or iron with a bit of clean linen rag.

840. To make Shoes Waterproof.—Warm the soles of the shoes or boots, and rub them well with tar. Put the shoes at a moderate distance from the fire till the tar has soaked into them. Add a few iron filings to the tar, if you wish them to be particularly hard and impenetrable.

The smell of the tar will go off by wearing the shoes one day. It may perhaps be necessary to renew the application twice during the winter.

841. To make Glass a very deep Red.—Take twelve pounds of crystal frit, a pound of broken pieces of white glass, and two pounds of calcined tin, mix them together, and put them into a pot to run and purify, and when they are melted, take calcined steel, scales of iron falling from the anvil, of each a like quantity; grind them together, and when the metal is purified leisurely, put an ounce of these to it, so mix them well, and let them incorporate, which they will easily do in five or six hours; but beware you put not in too much powder, for that will make the metal black, when it ought to be transparent, and not opacous, of an obscure yellow. When you

find it so, forbear putting in any more powder, but put in three quarters of an ounce of brass calcined to redness; let it be well ground, and in three or four times using, it will be a blood red, for which reason make frequent essays to try the goodness of the colour, take it in the nick, or it loses its colour and turns black. That it may not do so, leave the mouth of the pot open. Let it not stand above ten hours in the furnace, suffering it to cool as little as possible. If you perceive the colour fade (as it sometimes does) put in some scales of iron to enliven it. As this is one of the nicest colours to be made, be very careful in every thing, especially in adding steel and scales, as also in working it.

842. To cover Bars of Copper with Gold, according to the method invented by Mr. Turner of Birmingham, so as to be rolled out into Sheets.—First prepare pieces of copper of convenient *lengths* and *sizes*, then clean and make their surface level, and having plates of pure or *alloyed* gold of the same breadths and lengths, and of a thickness to suit your intentions; place the plates of gold upon the pieces of copper, and hammer and compress them together till their surfaces are fitted, then bind them in that situation with wire, and take silver filings mixed with borax to assist the fusion, and lay it upon the edges of the plates of gold, and ingots of copper, and place them on a stove till the silver and borax is melted, and the gold adheres perfectly with the metal; it is now ready for rolling out into sheets.

843. THE GRECIAN MODE OF GILDING.—Take equal parts of muriate of ammonia (see 664) and muriate of mercury, *(mind this is virulent passion)*, and dissolve them in spirit of nitre, (see 186) brush your silver over with this solution, and it will become black, but expose it to a red heat, and it will assume the colour of gold.

844. To Gild by dissolving Gold in aqua regia.—Fine linen rags are required to be soaked in a saturated solution of gold in aqua regia, (403, 509), they must then be dried, and burnt to tinder. The substance to be gilt must be polished, and a cork dipped in a solution of *muriate of soda* (110) in water, then dipt in the tinder, must be well rubbed on the surface of the metal to be gilt, and the gold will appear in all its lustre.

845. FUSIBLE METALS.—No. 1.

Bismuth,	8 oz.
Lead,	5 oz.
Tin,	3 oz.

Melt the bismuth, then add the tin. This alloy is fusible at the heat of boiling water.

846. No. 2.—One part of each of the metals, zinc, bismuth, and lead melted together. This alloy is so fusible that it may be kept in fusion on a piece of paper over a lamp.

847. No. 3.—3 parts lead, 2 parts tin, 5 parts bismuth forms an alloy which melts at 198° Fahrenheit. This alloy is peculiarly adapted for taking casts from gems or seals ; in taking these *casts* the fused metal should be poured into a tea-cup, and allowed to cool, till it is just beginning to set, it must at that very time be cast into the mould, or it may be allowed to cool to the consistency of paste on a piece of paper or pasteboard, and the die, gem, or seal should then be stamped on it, and a very sharp impression will be obtained.

848. To form the Amalgam of Gold for Gilding.—Put a quantity of mercury into an iron ladle lined with clay, and on a charcoal fire let it be heated till it smokes. Then let gold previously granulated be heated red hot, and then added thereto, stirring all the while with an iron rod till the solution is complete. Pass the amalgam through shamoy leather; it will now have the thickness of butter, and contain about one part of gold, to three of mercury.

849. TO GILD BY THE AMALGAM, (848).—Let the metal to be gilt be previously well cleaned, by boiling in dilute nitrous acid; then having dissolved some mercury in aquafortis, with this solution wash over the surface of the metal to be gilt, it will then in that state be called quickened ; now apply the amalgam by putting the article and some of it into a white hat, and work the whole together with a soft painter's brush till the amalgam is uniformly spread. Sometimes the amalgam is laid on one part, and spread by a harder brush ; lastly it is exposed to a gentle heat, which expels the mercury; it is then cleaned with a wire brush, and afterwards coloured.

850. BELL METAL.—No. 1.

Copper, ...	6 parts.
Tin, ...	2 parts.

The specific gravity of this alloy is greater than that of the two metals in the uncombined state.

851. No. 2.

Copper, ...	10 parts.
Tin, ...	2 parts.

This is the proportion most in use for church and clock bells.

852. QUEEN'S METAL for Tea-Pots and other vessels which are meant to imitate silver.—No. 1.

Tin, ...	9 lbs.
Bismuth, ...	1 do.
Antimony, ...	1 do.
Lead, ...	1 do.

This alloy retains its lustre to the last.

853. Q. M. No. 2.

Tin,	100 lbs.
Regulus of Antimony,	8 lbs.
Bismuth,	1 lb.
Copper,	4 lbs.

854.—SPECULUM METAL.

Fuse Copper,	7 lbs. then add
Zinc,	3 do.
Tin,	4 do.

These metals fused form a beautiful alloy for specula for telescopes. (See Mudge's composition, 516).

855. STEREOTYPE PLATE METALLIC ALLOY, No. 1.

Lead,	9 parts, melted, then add
Antimony,	2 do.
Bismuth,	1 do.

This alloy expands as it cools, therefore the whole of the mould is accurately filled with the alloy, consequently there can be no blemish in the letters.

856. STEREOTYPE METAL, No. 2.

Lead,	8 parts.
Antimony,	2 do.
Tin,	$\frac{1}{8}$ do.

857. TO CAST STEREOTYPE PLATES.—Make up Plaster of Paris to the consistence of thick cream, and having oiled the types well, pour it over and work it amongst them with a brush, in about two minutes it will be hard: remove this cake of stucco which will have hollow impressions of all the types on its lower surface; place it now in an oven, and heat it till you drive off the moisture, then put it in the bottom of a flat cast iron pan, and cover it with another piece of cast iron, having holes in it, (say one at each corner), for the melted metal to enter by. Now emerge this cast-iron pan containing the plaster mould of the letter-press into the metallic bath, and having let it remain therein for a time, draw it forth, and let it cool, and a plate will be found with a most exact and perfect impression of the *letter-press.*

858. IMITATION SILVER, *or Pale Bell Metal.*

Tin,	$\frac{3}{4}$ oz.
Copper,	1 lb.

This alloy rolls and rings very near like sterling silver.

859. GOLD FROM 35s. to 40s. PER OUNCE.

Spanish copper,	8 oz. 8 dtws.
Silver,	10 dwts.
Gold coin,	1 oz.

860. TO GILD BY BURNISHING.—*Picture frames, mouldings, beadings and fine stucco work, are the subjects most chiefly on which this kind of gilding is practised* Carefully cover the surface to be gilt with *strong* parchment size, (see 619, 623). This coating being dried, six or seven more must be applied, mixed with fine *Paris Plaster*, or washed chalk; after the whole is dry, a moderate thick layer of size and yellow oxide of lead, or *Armenian bole* must be applied, and while this is just moist, the gold leaf must be laid on, it immediately adheres by pressing it on with a cotton ball, and before the size has become perfectly dry, burnish with an agate, or dog's tooth.

861. TO CLEAN DIRTY GILDED WORK.—Wash it with a soft brush dipt in hot spirit of wine or oil of turpentine.

862. TO RAISE THE BURNISH OF GOLD WITHOUT MUCH WORK.—While you slightly burnish the brilliant parts, deaden the rest, by drawing a brush over them dipped in size, and the effect will be obtained, but recollect a drop of water will leave a stain on this.

863. LEARNING TO SWIM BY THE ROPE, (see fig. 836). The use of the rope in *swimming*, is for learners to learn the action of swimming with the legs; but it is inferior to the plank, as will be afterwards shewn, because while the learner supports himself by the rope, his body is not in the natural swimming position, but retains too perpendicular a position in the water, so that, instead of striking backwards with his feet, he strikes downwards. In learning to swim, the legs should be kept as near the surface as possible, if he mean to acquire the ability of rapid swimming.

Note. The rope is more useful as a help to bathers, than swimmers, as by its aid the bather may exercise himself by tossing, tumbling, and rolling to and fro in the water, with the greatest ease and pleasure. *To be continued.*

864. To take spots out of Cloths, Stuffs, Silks, Cotton, and Linen.—Take two quarts of spring water, put it in a little fine white pot ash, about the quantity of a walnut, and a lemon cut in slices; mix these well together, and let it stand for twenty-four hours in the sun; then strain it off, and put the clear liquid up for use. This water takes out all spots, whether pitch, grease, or oil, as well in hats, as cloths and stuffs, silk or cotton, and linen. As soon as the spot is taken out, wash the place with fair water, for cloths of a deep colour, add to a spoonful of the mixture, as much fair water as shall weaken it.

Grease spots in cloths may be removed by using soap and water with a tooth or nail brush, and afterwards wiping off the lather with the wet corner of a towel. Essence of lemon, or pure spirit of turpentine, will remove pitch from cloth, &c.

THE PUZZLER.

865. SOLUTION OF CONUNDRUM (882, page 184).—She brings repentance.

866. SOLUTION OF (833).—The dark.

867. SOLUTION OF (834).—That not eaten.

"J. H" will oblige the editor by forwarding his recipe for *ginger cordial.* "J. P." has been received. In answer to a former communication, query 1st; the Japan ink *referred to* cannot be good; he is therefore advised to change the merchant he obtains his supply from, or prepare it himself according to the directions given (19) in this work, which will not have the fault complained of, namely, *turning brown.* Query 2nd, respecting Brugmatelle's fulminating powder will appear in an article so soon as time allows. Query 3rd, on sulphas soda, and sal soda; at the same time, "H. M. C." is informed that the information he requires concerning the *moon's change* and *eclipses,* would require at least two numbers of this work, and at same time a knowledge of Logarithus, to be communicated in any form that could be at all useful; but he is referred to page 407 of the English Encyclopædia for the information wanted; but a simple mode of finding the mean time of eclipses of both sun and moon will be given next number.

AUTHOR'S ADDRESS TO THE PUBLIC.

In submitting this fourth part of the EXPERIMENTALIST to public notice, I feel called upon to apologize to many of my correspondents, for what they may have deemed neglect on my part to their requests and friendly *hints,* but it has been out of my power to do otherwise, as I meant to confine myself as much as possible to the subjects mentioned at the conclusion of *Part 3rd,* viz. *Confectionary,* Gilding, Painting, Dyeing, and Distilling. I have done a little in each of these branches, but on Distillation least, which, of course, will take the lead in Part 5th. It has been suggested to me to give an index now, but from the great number of articles which this work contains, it would require at least twenty-four pages, or a whole part to itself; which I am inclined to think would be rather too heavy an index for a book of this size. I have therefore devised a scheme, whereby I am of opinion the same end may be obtained, and moreover, the field of this publication's usefulness be much extended. I mean in future to publish the Experimentalist in combination with the *first series* of my *Panoramic Dictionary,* (a work I have long had a wish to submit to the public.) This Dictionary while it shall be made to fulfil every purpose of an index to the Experimentalist, will, at the same time *open* a wide field for my own exertions in the diffusion of *useful information*; and also for its readers to exert their *criticisms on,* amuse their understandings, and perchance give credit to my unfettered reflections.

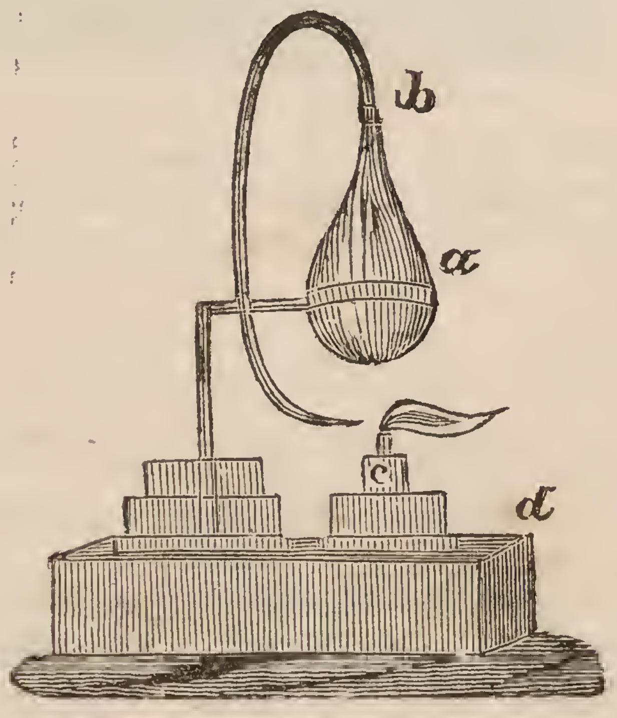
137, *Argyle Street, Glasgow,* 1835.

THE

CHEMICAL EXPERIMENTALIST,

OR,

An attempt to allure by Experiment,
AND GUIDE BY REASONING,
THE ENQUIRER AFTER
RATIONAL AMUSEMENT and USEFUL KNOWLEDGE,
Towards the cultivation of the simple and sublime Science—
CHEMISTRY.



BY JOHN KNOX STUART, M. D.

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AUTHOR OF
"THE MONITOR," on Consumption—"THE SILENT FRIEND,"—"THE DIRGE,"
on Cholera—"THE ARCANA OF LIFE,"—"THE REFORMER'S ALMANACK,"
"THE PANORAMIC DICTIONARY," &c. &c.

DECOMPOSITION is that death-like scene,
Where Nature's laws decree, incessant, universal change;
While COMPOSITION's generative womb,
Prolific, gives birth, new form of life, and re-creates the whole.

PART FIFTH.

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1835.

Stuart's Useful Information for the People, No. 37,

Being No. 25, of the

CHEMICAL EXPERIMENTALIST.

884. LEARNING TO SWIM BY THE PLANK.

885. DIFFERENT APPEARANCES OF HALLEY'S COMET, AT ITS DIFFERENT TIMES OF APPEARANCE, ITS DISTANCE FROM THE SUN AS SEEN AT ITS DIFFERENT APPEARANCES, AND THE PERIOD BETWEEN EACH OF ITS REVOLUTIONS.

Appeared.	*Distance from the Sun.*	*Appearance.*	*Period of Revolution.*
8th June, 1461.	11,700,000 miles.	Its tail extended over one-third part of the heavens.	
25th Aug. 1531.	11,600,000 ..	It had, (says Appian) no tail whatever, but was bearded.	75 years, 2 m. 17 days.
26th Oct. 1607.	11,750,000 ..	Head size of Jupiter, light weak, long tail, overcast with vapour.	76 years, 2 m. 1 day.
14th Sept. 1682.	11,650,000 ..	Smaller than last.	75 years, 10 m. 18 dys.
13th March 1759	11,650,000 ..	Smaller than last appearance.	76 years, 6 months.

886. THE CHINESE METHOD OF MAKING HENS HATCH FISH.—The fishermen collect with care on the margin and surface of the waters, those jelly-looking masses which contain *fish spawn.* They then take a fresh egg, and emptying the shell, fills it with this spawn; then stop up the hole, and setting it below a *sitting fowl;* after a certain number of days, they break the shell in water warmed by the sun, and the young fry are hatched. After this, they are kept in pure fresh water, till they be large enough to be thrown into a pond with old fish. *For the Chinese method of fattening fish, (see* 550).

887. TO MAKE RUM.—Take of figs and raisins, each one ounce; of ox leather, one drachm; pimento, eighteen grains; saffron, five grains; and whisky, two pounds, twelve ounces. Bruise the figs and raisins, cut the leather into small pieces, pound the pimento and the saffron, and let the whole soak for fifteen days in the whisky.

888. *Article 4th,* ON THE ART OF SWIMMING.—Use of the PLANK in learning to Swim.—The plank is a great aid to the young swimmer in learning to throw his legs and feet properly out. It should not be had recourse to till the swimmer can sustain himself in the water without any artificial aid; but afterwards it will be found of great advantage to support the body, while the young swimmer is endeavouring to strike out with the legs, as recommended (articles 815, 863). In this act he endeavours to push the *plank* before him, as seen (fig. 884); and take particular notice that the plank be held fast, and followed closely, as it has a tendency of darting forward, leaving the swimmer unexpectedly to sink over head and ears in the water. The use of the plank as an artificial aid in acquiring the art of swimming, cannot be disputed; but in practising with it, it is necessary to pay respect to the above precautions; viz. to be able to support yourself first without it; to keep a firm hold of it; and lastly, to follow it up closely.

889. HODGE'S GINGER CORDIAL.—Take four ounces of ginger at one shilling and fourpence per pound; one pound of raw sugar at sixpence; and one and a half pints of water. Mix the whole together, and put them on a slow fire, and boil down to 1¼ pints; and when done, strain it through a *silk cloth.* When this is done, put in one gill of spirits, and it is finished.

Note. A little soda added will cause the ginger to give out its strength.

890. Rule to calculate the mean time of the eclipses of either Sun or Moon, by Means of the conjunction of the Sun, Moon, and Nodes.—In the course of 223 mean lunations, after the *Sun, Moon,* and *Nodes* have been in conjunction, they return so nearly to the same place again, as that the same node which was in conjunction with the *Sun* and *Moon,* at the beginning of the first of these lunations will be within 28′12″ (28 minutes, 12 seconds of a degree) of being in a line of conjunction with the *Sun* and *Moon* again; and therefore in that time there will be a regular period of eclipses, or a return of the same eclipse for many ages. In this period, therefore, (and which was first discovered by the Caldeans), of 223 lunations, there are 18 Julian years, 11 days, 7 hours, 43 minutes, and 20 seconds; when the last day of February in leap years, is four times included; but when it is five times included, the *period* is eighteen of such years, and only 10 days, 7 hours, 43 minutes, and 20 seconds; therefore, to find the mean time of any eclipse of either sun or moon, merely add 18 Julian years, 11 days, 7 hours, 43 minutes, and 20 seconds, (when the last day in February comes in only four times, and one day less when it comes in five times; and you will have the mean time of any eclipse of either sun or moon.

891. To remove spots of Grease from Books and Prints.—After having gently warmed the paper stained with grease, wax, oil, or any fat body whatever, take out as much as possible of it, by means of blotting paper. Then dip a small brush in the essential oil of well-rectified spirit of turpentine, heated almost to an ebullition, (for when cold, it acts only very weakly), and draw it gently over both sides of the paper, which must be carefully kept warm. The operation must be repeated as many times as the quantity of the fat body imbibed by the paper, or the thickness of the paper, may render necessary. When the greasy substance is entirely removed, recourse may be had to the following method to restore the paper to its former whiteness, which is not completely restored by the first process. Dip another brush into highly rectified spirit of wine, and draw it, in like manner, over the place which was stained, and particularly round the edges, to remove the border, which would still present a stain. By employing these means, with proper caution, the spot will totally disappear; the paper will resume its original whiteness; and if the process has been employed on a part written on with common ink, or printed with printer's ink, it will experience no alteration.

892. The following notice of Halley's Comet, I have extracted from Pinnock's Guide to Knowledge.—"The Halley comet is now visible in the east, near the constellation *Taurus.* At this time its distance from the earth is 40,000,000 of miles. On the 13th of September it will be only 22,000,000 of miles distant, and from this time will become brilliant. In the latter part of September it will enter the *Twins;* and on the 1st of October will reach within 6,000,000 of miles of us, in the fore feet of the *Great Bear,* where it no more sets. At this its brilliant and apparent magnitude will have arrived at the highest degree. On the 6th of October it will stand nearest the earth, only three and a half million of miles distant. In the beginning of the year 1836 it will emerge from the sunbeams, and again become visible, at the distance of 40,000,000 of miles from us. It will, for the second time approach the earth; and on the 1st of March, 1836, will stand 25,000,000 of miles distant. Thence it will recede from the earth, and seem to wander seventy-six years; and in the year 1912 it will again visit our regions."—*New York Commercial Advertiser, Aug.* 1834.

893. A Correspondent of a Dublin Paper has the following, in reference to the above:—"Seeing in your paper an extract from a New York paper, stating that Halley's Comet was visible in the constellation *Taurus,* I beg leave to state, that that comet will not be visible to this planet previous to August, 1835, when it will be nearly verticle in this latitude, and will be visible in the evening, in the constellation of the *Great Bear,* never setting for several days."

894. WHIRLPOOL NEAR THE FALLS OF NIAGARA.—There is a whirlpool in this part of Niagara, a little more than half way from the Falls to Queenstown, and which, of its kind, is not less remarkable than the Falls themselves. At this point the river, in its compressed, deep, and rapid course, makes a sudden turn, or sharp angle, the effect of which has been to wear out and form a basin of considerable extent in a precipitous bank 200 feet high, in which the waters of the river, as they come rushing from above, take a sweep before they can escape by the angle which intercepts the channel, and find their passage in a downward course, by which it will be seen that a number of currents at this point must necessarily cross each other between the surface and the bed of the river in the formation of this remarkable phenomenon. It uniformly happens, in the great variety of floating materials descending the river, such as logs, and timber of various sorts, that portions of it are detained for days, and sometimes for weeks, sweeping the circuit of this basin, and every few moments returning by the draft of the whirlpool, and as they approach the vortex are drawn in with great rapidity, aud submerged to descend no one knows how deep, until by and by, following the currents, they appear again on the surface of the basin, to make the same circuit, and again to be drawn into the vortex. It has sometimes happened that the bodies of persons who have had the misfortune to get into the rapids above the Falls, and to be drawn down the awful cataract, or who have been drowned between the two points, after the usual process of decomposition has lightened their specific gravity, and raised them to the surface, have been seen for days floating around this whirlpool, and making the customary and successive plunges to which every thing that comes within its reach is doomed, without the possibly of rescue. It also happened during the last war between the United States and Great Britain, that a British soldier upon a raft of palisades, which had been cut on the margin of this basin for the fortifications of Queenstown, was sent adrift into this whirlpool, by the parting of a rope connected with the shore, in the attempt to float the raft out of the basin into the river below. The force of the currents not being duly estimated, as the raft approached the vortex, drawn by the hands of other soldiers on the shore, and attempting a passage at what was deemed a prudent distance, the too feeble cord snapped asunder, to the amazement and horror, not only of the unfortunate man afloat, but equally of his comrades, who were compelled without any means or hope of extending relief, to witness the unhappy fate of the devoted victim. In a moment the raft was seen careering with increased rapidity towards the visible and open centre of the whirling waters, where its immediate and total wreck was justly deemed inevitable, and down it went, and the man upon it, with "convulsive splash," and now nothing was seen. The spectators shrieked in sympathy. A soldier has his fellow-feeling. Had their comrade fallen in battle they might have trampled on his carcass in the onset of a charge, in disregard to his suffering; but that

he should be thus unexpectedly and fearfully swallowed up by the flood! their nerves were ill prepared for the shock. He was gone; and with his disappearance disappeared all hope. But what was their surprise while, with vacant stare, and every feeling astounded, they gazed upon the scene, the raft and their comrade clinging to it suddenly shot up on the surface of the waters, and seemed to be floating back to their embrace. "Well done! bravo!" they cried, rending the pent-up region with their ejaculations Alas! instead of making towards the shore or coming within the reach of the throw of a line (for every one was now in stretch of all his powers to afford relief, and the unfortunate man crying for help), the raft was borne irresistibly along the current before described, and in a few moments began again its rapid sweep towards the vortex. Again the men on shore were thrilled with horror in expectancy of the fate of their companion, and he, smiting his heart in despair, fell upon his knees, lifting his face toward heaven, and seemed to be making his last commendations of himself to the mercy of God—and the next moment down again he plunged, and was swallowed up in the deep! His comrades stood still, and gazed upon the vacant waters, awaiting in breathless anxiety the emergence of the severed fragments of the raft. Nevertheless, to their unspeakable joy, the raft and the man emerged as before. The welcome of this second preservation for a moment rekindled hope, and suggested every possible expedient to accomplish a connection between the shore and the raft, but all in vain; the unfortunate man, in the agony of his despair, supplicated their aid. But what could they do? Again the raft and its yet living tenant were on their wheeling and rapid circuit towards the fearful vortex. Again he fell upon his knees, and again plunged into the deep, and disappeared. Who now could hope in such a case? Even if he should emerge again, it would only be to make the same round, and fall again into the power of the same merciless and insatiate appetite. Did he rise again? Ay, he did. And if the story may be believed, the raft and the man continued this perpetual round until the intelligence was conveyed to Queenstown, some three miles below; and a boat, drawn out of the river, and transported on wheels, and launched from the lofty bank of 200 feet, down through the trees upon the basin, and the man was taken off, to serve yet longer, and fight the battles of his King; and, for ought that is known, he is still in his regiment. Scores of times he faced the frowning terrors of the scene—made the deep plunge as many times—took breath at every interval, and was saved at last.—*Cotton's Tour of the American Lakes.*

895.—COMET OF 1770 LOST.—The readers of the EXPERIMENTALIST will be aware that four new planets have been discovered between the orbits of Mars and Jupiter, viz. *Ceres*, 1st Jan. 1801, *Pallas*, 28th March, 1802; *Juno*, 1st September, 1804; *Vesta*, 29th March 1807. These four newly discovered *planets*, are supposed to be fragments of some larger planet which previously had revolved between the orbits of Mars and Jupiter, and which has been burst asunder by some great internal convulsions; and it has been supposed that the showers of meteoric stones, which have at different periods fallen upon earth, has been small portions of this dissevered planet. By referring to article 669, it will be seen that this *Comet* of 1770 has, from natural causes, several times assumed different orbits. For instance, it revolved in an orbit of 50 years, previous to 1767; but, from coming in contact at that time with Jupiter, it revolved afterwards in an *ellipses* of 5½ years; (there is a typographical error in article 669, instead of *eclipses* read *ellipses)* but in two more revolutions, viz. in eleven years, it came again within the sphere of *Jupiter's* control, and had its course again changed into an *elliptical orbit* of twenty-one years; but astronomers have, for the last forty years, watched and waited in vain for its re-appearance. It is a fact that Mr. Messier carefully observed this *Comet* for nearly four months in 1770, and Mr. Lexell of St. Petersburgh, and Dr. Burckhardt, at the request of the National Institue, both ascertained that the elements of its *elliptical orbit* was 5½ years; and further, that this comet differed from all other comets in this circumstance: that the extremity of the outmost range of its orbit never stretched beyond the orbit of *Saturn*, whilst all other *Comets* stretch the limits of their range far beyond the utmost confines of the solar system. The path of this comet from the above *data*, intersects the orbits of *Venus*, the *Earth*, *Mars*, the four new planets, *Ceres*, *Pallas*, *Juno* and *Vesto*, with *Jupiter*. This comet therefore has been found to be a portion of our system, and must have made several revolutions within the range of our observation since it was last seen, not having appeared again. It is therefore lost—but in its stead it is supposed that the immense atmospheres that surround two of the new planets, Ceres and Pallas, arises from their having shared that comet amongst them. The atmosphere of our earth is supposed to be only 45 miles in height, and its diameter about 7000 miles; whilst the atmosphere that surrounds Ceres is 675 high, and its own diameter only 1024; and Pallas's atmosphere rises to 468, while its diameter is 2090 miles. In short, the atmosphere of these two, (comparatively speaking) small planets, are higher than the united heights of all the other planets put together, and are at least a thousand times higher than than they ought to have been, in respect to the ratio of the height of the atmosphere of the other planets to their respective bulks. On that account, astronomers have called these two planets *asteroids*, (supposing them to partake of the nature of both *planets* and *comets*.) One thing is certain, the comet cannot be found, and that the *nodes* of the comet of 1770 lie exactly between the nodes of *Ceres* and *Pallas*, and that the other two fragments viz. Juno and Vesta, of the great planet, have no atmospheres at all. My own opinion is not that this comet is entirely annihilated, but rather that that body of electric matter which streamed from it, and formed its immense tail, whereby it became visible to us, has been discharged from it, or in other words attracted by these two planets while in their nodes, and therefore the comet may yet be revolving in our system, though unknown to us, because it will now have only the ordinary appearance of a star, being only what has been by astronomers called the nucleus of a comet.

896. THE MOON—NEWTON AND GRAVITY.—Newton supposed the moon to be held in her orbit around this earth by gravity, and also that all the other primary planets revolved in orbits round the sun from the same cause. He found that the force or strength of gravity decreased in proportion as the square of the distance increases.

897. TO MAKE SHELL GOLD.—Make a solution of this precious metal in aqua regia, (see 403, 509,) then precipitate the gold from the solution, by adding a watery solution of the proto-sulphate of iron, (green vitriol) or strips of metallic copper, and let it be spread on the inside of shells with a little gum water.

898. RULES FOR BURNISHING GOLD.—The burnisher must be of agate or blood-stone, and some white-lead is required, with a piece of sheep-skin for wiping, a little vinegar, and a piece of clean white linen to hold the article with. Apply the burnish lightly to the gilding, and never rub in a cross direction, or the gilding will appear scratched. After having rubbed a little, cleanse the surface with a little vinegar or white lead, and wipe softly with your soft linen rag, and re-commence to burnish till your goods have a satisfactory appearance.

899. French Method of transferring engraved patterns to Porcelain.—Cast a sheet of fine glue about a quarter of an inch thick, and delute it while warm to such consistence, as when cold, it shall have the flexibility of leather. Let this glue be pressed upon the inked plate with the hand, the colours will be transferred to the glue from the plate, which will be again transferred from the glue to the porcelain on its application thereto.

900. To prepare Prince Rupert's Drops.—Drop while red-hot, into cold water, small pieces of common green glass, they will thus take a tear-like form. The sphere-like portion will bear very rough treatment, but if the smallest particle of the tail be broken off, that instant the whole flies into countless fragments.

901. Astonishing Phenomenon attendant on the fracture of one of Rupert's Drops, in a Phial or tall glass filled with water.—If one of these drops be immersed in a vessel of glass filled with water, and its small end be broken off with a pair of pinchers, it shall rend so suddenly, as infallibly to break the stoutest wine or beer bottle.

902. Red Stain for Gloves.—Merely add three drops of sulphuric acid to the orange stain, (see) before using.

903. Lemon Yellow Stain for Gloves.—Add to one part of pure silver, (precipitated) twelve parts of pipe clay finely powdered, and mix them in a basin with cold water to the proper consistence.

N. B. The tint of these different stains ( ) may be rendered deeper or lighter by increasing or diminishing the pipe clay or venetian red.

904. Green Stain for Glass.—Merely paint on the opposite side of lemon yellow stained glass with blue, and a fine transparent green will be produced.

905. To imitate Ground Glass.—With a camel hair pencil dipped in oil of amber, dim the surface of the glass. Then with a mixture of one part oxide of tin, and three parts flux well ground and sifted through a lawn seive over the glass until the whole surface is only covered. It will have the appearance of ground glass.

906. TURNIP BREAD.—Let turnips be washed clean, pared, and boiled, and when reduced to a softness fit for being washed, let the water be pressed out of them, and then mix them with an equal quantity by weight of coarse wheat flour.

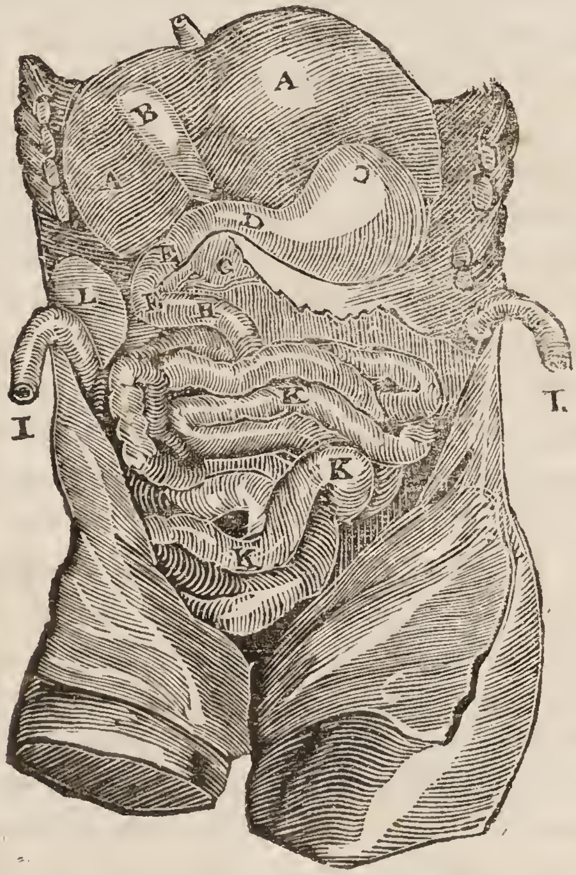
907. To grind Spectacle Glasses convex on both sides.—The first thing to be attended to in preparing these lenses is to ascertain the proper focal distance. Then take a pair of compasses, and open them to the full focal distance, and planting one foot of the compasses on a sheet of copper, describe an arch or segment of a circle with the other. Now let the plate of copper be filed away from the outside of the segment, and thus you will have a gauge of the convexity required. Next let a circular piece of brass about ⅛ of an inch in thickness, be turned concave so as to fit this guage properly. The whole being thus prepared, the tool being firmly fixed, and the glass to be ground also fixed to the end of a wooden handle, by one of its surfaces being seated in softened pitch, (recollect the centre of the axis of this wooden handle must exactly coincide with the centre of the glass) sprinkle fine emery on the tool, and work the glass with circular and cross strokes therein till the surface of the tool and the glass coincides in every point, use finer and finer emery, till lastly, finely powdered pumice stones. Lastly, coat the inside of the tool with a mixture of bees' wax, and dry red sulphate of iron, which has been previously well washed, and polish with this tool after the same manner as it was before ground, and an excellent lens will be formed.

Stuart's Useful Information for the People, No. 38,

Being No. 1 of the

PANORAMIC DICTIONARY.

908. ABDOMINAL VISCERA—THE ABDOMEN LAID OPEN.



909. ABDOMEN.

From Abdo, (to hide), *because it hides the viscera,* (the belly). The viscera hidden or contained in the abdominal cavity, are, the stomach, *c d,* the intestines, *k k k,* the liver, *a a,* the pancreas, not seen in the figure; but the pancreatic duct is seen coming from it to terminate in the duodenum, at the side of the common billiary duct. The spleen, the kidneys, the urinary bladder, with some of the organs of generation and appendages, fill up the rest of the cavity. These parts are all wholly or partially enveloped by a serous membrane called the peritoneum, which lines the walls of the abdomen.

REFLECTION 1st. The abdominal viscera are very important in several points of view: 1st. As receivers of the aliment, and elaborators of *it* into *chyle* for to supply the *waste of blood* required to sustain the wear and tear of the body as a whole. 2nd. They are important in their arrangement; for instance, the stomach is situated horizontally at the upper part of this cavity to receive the food from the œsophagus or gullet; and nearly on the same level with it lies the liver on the right side, the spleen on the left, and the pancreas behind; in order immediately so soon as the stomach passes the *chymified* food into the upper extremity of the bowels, the liver may pour in its *bile*, and the pancreas their pancreatic juice, in order to aid or perform the second process of digestion; viz. to convert that which has been already made into chyme into *chyle*. Another use no less necessary is performed by the bile upon the intestines and their contents; the resinous part of it is very irritating and bitter; it by these properties excites the bowels into what is called their peristaltic motion, whereby their contents are forced along the alementary canal, till the excrementitious part is voided by the anus. The bile therefore is *nature's purgative*, and therefore every person, who, by purgatives, purge and continue to purge their patients in order to cure an obstinacy in their bowels, are either *idiots* or *knaves* of the lowest grade. The liver is the natural work shop where the true and natural purgative is prepared; therefore whenever there is a continued disposition to *costiveness*, the liver must be at fault—the bile must either be deficient in quantity or quality. The rational way in treating such a case, is therefore not to substitute an endless artificial purging, by *aloes*, *gamboge*, *colocynth*, and other bitter and irritating drugs, but to set about restoring the liver to its healthy state, when it will supply the natural purgative, and promote digestion; thus, by such a rational mode of procedure, may both *doctor* and *patient* expect a blessing on their curative endeavours.

3rd. The natural theologist will, on inspecting the situation of the various organs, while at the same time his is attending to their separate uses, find a wonderful adaptation of means to ends. Here will be found neither Greek nor Latin to bamboozle, but a page of nature within himself, which, when reflected on, will excite him to proclaim, "truly I am the product of a beneficent and *intelligent power.*

910. ABLUTION.

In chemistry signifies the purifying of a body by repeated effusions of a proper liquor.

911. ABORTION.

(See second series of the Dictionary.)

912. ABRAHAM

Is a name famous in Asia Minor and Arabia, like Thaut among the Egyptians, the first Zoroaster in Persia, Hercules in Greece, Orpheus in Thracia, Odin among the northern nations, and many others known rather by their celebrity than by any authentic history. Here I speak only of profane history; for as to that of the Jews, our teachers and our enemies, whom we believe and detest at the same time, the history of this people having manifestly been written by the Holy Ghost, we have for it all the sentiments we ought. We here address ourselves only to the Arabs, who boast of being descended from Abraham by Ishmael, and believe that this patriarch built Mecca, and that he died in this city. The truth is, that Ishmael's progeny has been favoured by God infinitely more than that of Jacob. Both races, indeed, have produced robbers, but the Arabian robbers have prodigiously surpassed the Jewish. Jacob's descendants conquered only a very small country, and that they afterwards lost; whereas the descendants of Ishmael have extended their conquests over a part of Europe, Asia, and Africa; have founded an empire greater than the Roman, and have driven the Jews from those holes of theirs, which they called the Land of Promise.

To judge of things only by the instances of modern histories, it is not likely that Abraham should have been the father of two nations so very different; we are told that he was born in Chaldea, the son of a poor potter, who subsisted by making little earthen idols. Now, how should this potter's son go and found Mecca, at the distance of three hundred leagues, and over impracticable deserts? If he were a conqueror, he certainly would have bent his arms against the fine country of Assyria; and, if only a poor man, as represented to us, he could hardly have found kingdoms in foreign parts—his only monarchy must have been his home.

Genesis makes him seventy-five years of age, when he left the country of Haran, after the death of his father, Terah the potter. But the same book says, that Terah, having begotten Abraham in his seventieth year, lived to the age of two hundred and five years, and that Abraham did not leave Haran till after his father's decease; thus, from Genesis itself, it is clear, that Abraham, when he left Mesopotamia, was a hundred and thirty-five years of age; and he only went from one idolatrous country to another, called Sichem, in Palestine. And wherefore did he go thither? Why leave Euphrates' fertile banks for so rocky, so barren a country as that of Sichem, and withal so remote? The Chaldean tongue must have been very different from that of Sichem; neither was it a trading place. Sichem is above a hundred leagues from Chaldea, and with many deserts to pass through; but God ordered him on this journey, intending to shew him the country which his issue were to possess many centuries after him. The reason of such a journey are what the human mind can never conceive.

No sooner had he reached the little rocky country of Sichem, than a famine obliges him as hastily to decamp, and he goes away to Egypt in quest of a subsistence. Memphis lies two hundred leagues from Sechim; now is it natural to go for corn so very far, and where one knows nothing of the tongue. These are odd peregrinations for a man nearly a hundred and forty years old!

With him, he brings to Memphis his wife, Sarah, who, in age, was little more than a child to him, being only in her sixty-fifth year. As she had a great share of beauty, he was for turning it to account: make as if you were only my sister," said he to her; "that I may have kindness shown to me for your sake." He rather should have said to her, "Make as if you were my daughter."—The king became smitten with young Sarah, and gave her *sham* brother abundance of sheep, oxen, he-asses, she-asses, camels, and man-servants and maid-servants; a proof that Egypt, even then, was a very powerful and well policed, and consequently a very ancient kingdom; and that brothers, coming to make a tender of their sisters to the kings of Memphis, were magnificently rewarded.

Young Sarah had, according to Scripture, reached her *ninetieth* year, when God promised her, that Abraham, then full a hundred and sixty, should get her with child within the twelvemonth!

Abraham, being fond of travelling, went into the frightful wilderness of Kadesh, with his pregnant wife, who, it seems, was still so *young and pretty*, as to kindle in a king of this wilderness the like passion which the Egyptian monarch had felt for her. The father of the faithful here enjoined her the same—*lie*—as in Egypt; and thus his wife, passing for his sister, got more cattle and servants; so that Sarah turned out no inconsiderable fortune to him. Commentators having written a prodigious number of volumes to justify Abraham's conduct, and reconcile the chronology, to those commentaries we must refer the reader. They are all the works of men of great parts and sagacity, consummate metaphysicians, void of all prepossession, and the farthest in the world from any thing of pedantry.—*Voltaire.*

913. ABSCESS.

An abscess is the result of previous inflamation, terminating in suppuration. Inflamations have several terminations, as re-solution, suppuration, and gangrene, or mortification. An inflammation is said to have terminated in re-solution, when the heat and pain gradually subside: in suppuration, when matter is formed; and in gangrene or mortification, (which are nearly synonymous terms) when the parts become dead, while the surrounding parts remain alive. Abscess is therefore the suppurating termination of inflammation.

Reflection 1st. The first thing to be attended to in the formation of an abscess, is to ascertain whether it has arisen from some local injury simply; while the rest of the body remains in a sound state of health, or whether it be not a luxuriance of constitutional disease. In the first case, the treatment is simply to open the abscess, if it do not burst of itself, and keep it clean till it heal. In the latter case, it can only be combated by constitutional treatment, which, be it recollected, does not consist in a continual purgation of the aliment or food through the bowels, by drastic purgative pills, salts of Epsom, glauber, and what not, but by a contrary treatment, which ought not to purge and exhaust the bowels, and impoverish the blood, but which, on the contrary, shall be absorbed and taken into the system, and carried to every tissue and fibre of the body, so that a constitutional regeneration of the whole to a vital and healthy action may be the consequence.

Reflection 2nd. It is not by purging, and driving the aliment (or food) througn the alimentary canal, (or bowels), that the body can be regenerated. By so doing, we only famish the body, by impoverizing the blood, and only increase the constitutional disease. Instead, therefore, of giving purging medicines, we ought to administer correctives which shall not purge, but be absorbed along with our aliment, and be carried with our blood to every tissue and fibre of the body.

914. ACIDS.

The characteristics of acids are,

1. A peculiar taste termed acid.
2. Changing blue vegetable juices to red.
3. Combining with alkalies, earths, and metallic oxides.

Acids are divided into three classes, according to the kingdom of nature—they are derived from 1st, into mineral; such as the sulphuric, nitric, muriatic, &c. 2nd, into vegetable, such as the acetic, tartaric, gallic, &c. and lastly, into animal; such as the phosphoric, prussic, and uric. Experiment has proven that most acids are composed of oxygen gas, combined with some other body as a basis, hence, the origin of the word oxygen, which signifies *generation of acid;* it has therefore generally been regarded as the *acidifying basis,* or principle of acidity. If an acid basis, such as sulphur, be perfectly saturated with oxygen, it is distinguished from others less saturated by the syllable *ic* being added to the basis. Thus, in the present instance, sulphur-ic; but if the basis predominate it is terminated by the syllable *ous,* such as sulphur-ous; and if the *acidifiable basis* be combined with oxygen, without shewing any signs of acidity, it is called an *oxide.* Thus iron, heated and exposed to the air or water, attracts oxygen, and forms the oxide (rust) of iron.

915. ACID, CARBONIC.

(See 60, Experimentalist, page 13).

916. ACID, GALLIC.

(See 16, Experimentalist, page 5).

917. ACID, MURIATIC.

(See 103, 394, 399, Experimentalist, page 84).

918. ACID, NITRIC.

(See 155, 184, Experimentalist, pages 30, 36).

919. ACID, PHOSPHORIC.

(See 365, Experimentalist, Page 76).

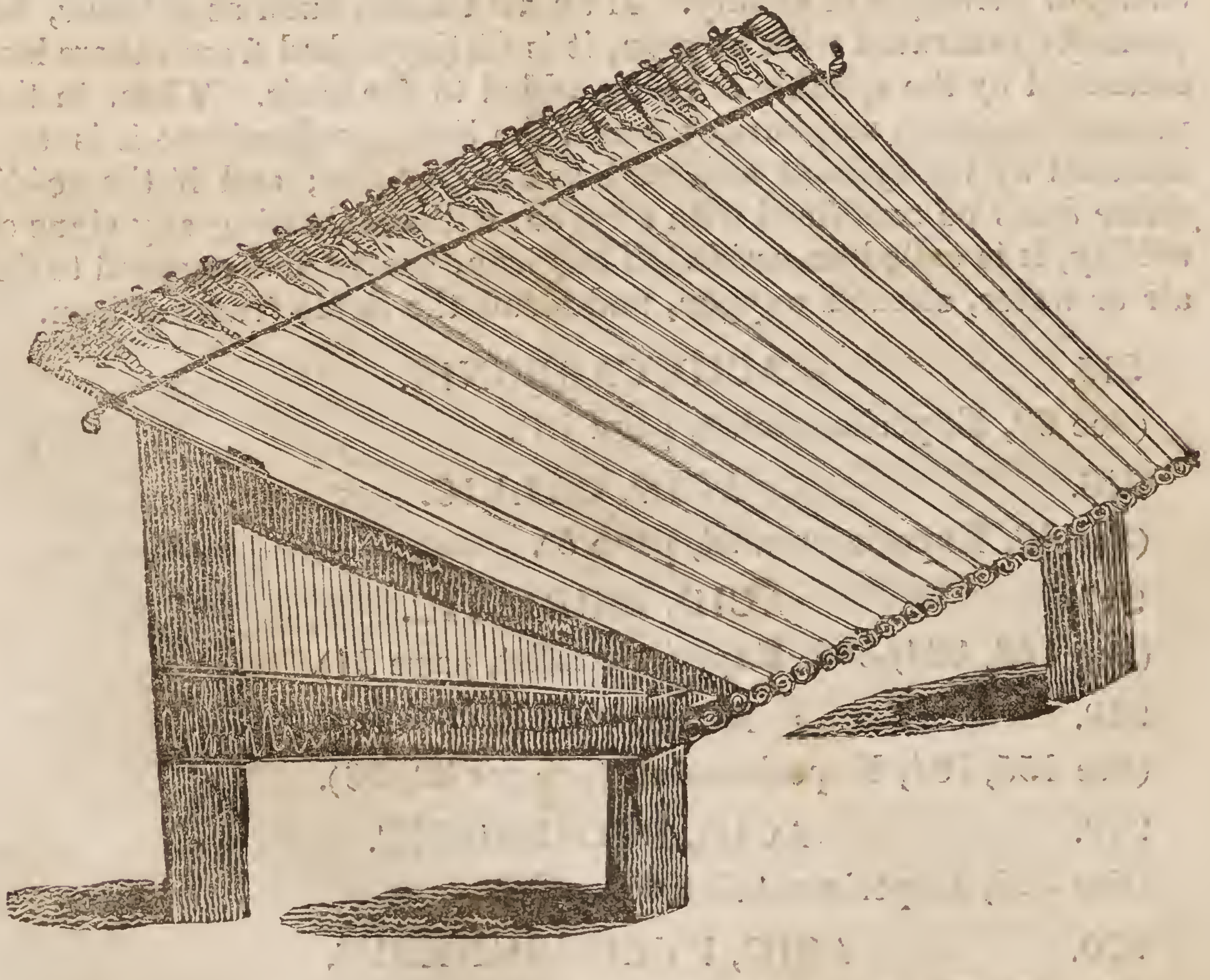
920. ACID, PYRO-LIGNEOUS.

(See 271, Experimentalist, page 57).

SCIENTIFIC AMUSEMENTS.

920. PORTRAIT OF GERARD, ALIAS FIESCHI.

921. THE INFERNAL MACHINE.



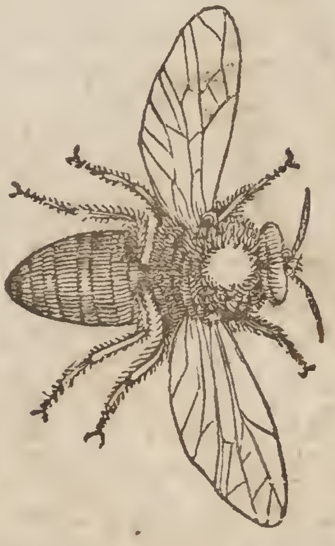
Want of room precludes a description of this amusing machine, with its author, in this number, but it will appear in next week's publication.

Stuart's Useful Information for the People, No. 39,

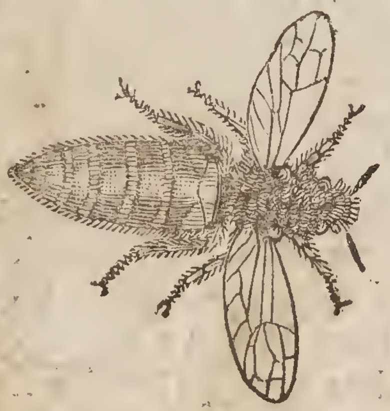
Being No. 26, of the

CHEMICAL EXPERIMENTALIST.

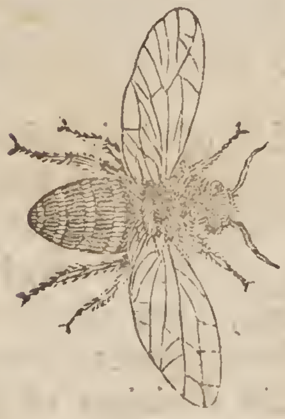
923. DRONE.



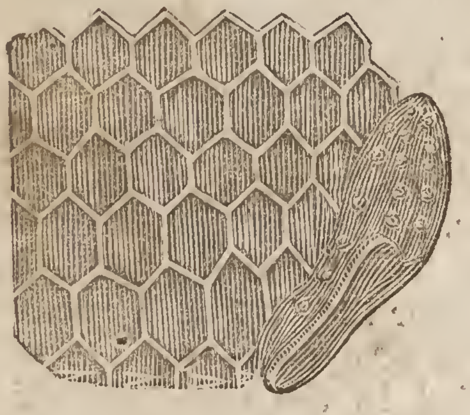
924. QUEEN.



925. WORKING BEE.



926. QUEEN'S CELL.



927. BEES.—These insects are very numerous, and differ considerably in their habits. Some are found in extensive communities constructing, with the utmost art, cells for their young, and repositories for their food; while others both dwell and work in solitude. The whole tribe live on the nectar of flowers and on ripe fruit. We shall however, more particularly confine ourselves to the description of the Hive Bee.

In the history of Bees, their habitation is the first thing that deserves to be mentioned: as most people, however, are acquainted with its appearance, we shall confine ourselves to those particulars which are not so well known.

The walls of the cells are so extremely thin that their mouths might be thought in danger of suffering by the frequent entering and issuing of the Bees. To prevent this disaster, however, they make a kind of rim round the margin of each cell, and this rim is three or four times thicker than the walls.

It is difficult to perceive, even with the assistance of glass hives, the manner in which bees operate when constructing their cells. They are so eager to afford mutual assistance; and for this purpose so many of them crowd together, and are perpetually succeeding each other, that their individual operations can seldom be distinctly observed. It has however, been discovered, that their two jaws are are the only instruments they employ in modelling and polishing the wax. With a little patience and attention, we perceive cells just begun; we likewise remark the quickness with which a bee moves its teeth against a small portion of the cell. This portion the animal by repeated strokes on each side, smooths, renders compact, and reduces to a proper thinness. While some of the hive are lengthening their six-sided tubes, others are laying the foundations of new ones. In certain circumstances, when extremely hurried, they do not complete their new cells, but leave them imperfect till they have begun a number sufficient for their present exigencies. When a bee puts its head a little way into a cell, we easily perceive it scraping the walls with the points of its teeth, in order to detach such useless and irregular fragments as may have been left in the work. Of these fragments, the bee forms a ball about the size of a pin's head, comes out of the cell, and carries this wax to another part of the work, where it is wanted; it no sooner leaves the cell, than it is succeeded by another bee, which performs the same office, and in this manner the work is successively carried on till the cell is completely polished.

Their mode of working, and the disposition of their labour, when put into an empty hive, exhibit, in the strongest light, the sagacity of bees. They immediately begin to lay the foundations of their combs, which they execute with surprising quickness and alacrity. Soon after they begin to construct one comb, they divide into two or three companies, each of which in different parts of the hive is occupied in the same operations. By this division of labour, a great number of bees have an opportunity of being employed at the same time, and consequently, the common work is sooner finished. The combs are generally arranged in a direction parallel to each other. An interval or street between them is always left, that the bees may have a free passage, and an easy communication with the different combs in the hive. These streets are just wide enough to allow two bees to pass one another. Besides these parallel streets, to shorten the journey when working, they leave several cross passages which are always covered.

They are extremely solicitous to prevent insects of any kind from getting admittance into their hives. To accomplish this purpose, and in order to shut out the cold, when they take possession of a new hive, they carefully examine every part of it; and if they discover any small holes or chinks, they immediately paste them up firmly with a resinous substance which differs considerably from wax. This substance is known by the name of Bee-glue. Bees use it for rendering their hives more close and perfect, in preference to wax, because it is more durable, and more powerfully resists the vicissitudes of the weather. This glue is not, like the wax, procured by an animal process. The bees collect it from different trees, such as the poplars, the birches, and the willows. It is a complete production of nature, and requires no additional manufacture from the animals by which it is employed. After a bee has procured a quantity sufficient to fill the cavities of its two hind legs, it repairs to the hive. Two of its companions instantly draw out the load, and apply it to fill up such chinks, holes, or other deficiencies as they find in their habitation. But this is not the only use to which bees apply the bee-glue. They use it also to remove such insects or foreign bodies as happen to get admission into the hive. When so light as not to exceed their powers, they first kill the insect with their stings, and then drag it out with their teeth. But it sometimes happens that an ill-fated snail creeps into the hive; this is no sooner perceived than it is attacked on all sides, and stung to death. But how are the bees to carry out so heavy a burthen? Such a labour would be in vain. To prevent noxious odours consequent on its putrefaction, they immediately embalm it, by covering every part of its body with the bee-glue, through which no effluvia can escape. When a snail with a shell gets entrance, to dispose of it gives much less trouble and expence to the bees. As soon as it has received the first wound from the sting, it naturally retires within its shell. In this case, the bees, instead of pasting it all over with bee-glue, content themselves with gluing it all round the margin of the shell; which is sufficient to render the animal for ever immoveably fixed. But this bee-glue, and the materials for making wax, are not the only substances that these industrious animals have to collect. As besides the whole winter, there are many days in summer in which they are prevented by the weather from going abroad in quest of provisions; they are, therefore, under the necessity of collecting and amassing in cells destined for that purpose large quantities of honey. This they extract, by means of their trunk, from the nectariferous glands of flowers. After collecting a few small drops of honey with this, the animal carries them to its mouth, and swallows them. The bees are obliged to fly from one flower to another till they fill their first stomachs. When they have accomplished this, they return directly to the hive, and disgorge in a cell the white honey they have collected. It not unfrequently happens however, that on its way to the hive the bee is accosted by a hungry companion. How the one manages to communicate its wants to the other, it is perhaps impossible to discover. But the fact is certain, that when two bees meet in this situation, they mutually stop, and the one whose stomach is full of honey, extends its trunk, opens its mouth, and, like a ruminating animal, forces up the honey into that cavity. The hungry bee, with the point of its trunk, sucks the honey from the other's mouth. When not stopped on the road, the bee proceeds to the hive, and in the same manner offers its honey to those who are at work, as if it meant to prevent the necessity of quitting their labour in order to go in quest of food. In stormy or rainy weather, the bees feed on the honey laid up in open cells; but they never touch their reservoirs while their companions are enabled to supply them with fresh honey from the fields. But the mouths of those cells which are destined for preserving honey during the winter, they always cover with a lid, or thin plate of wax.

How numerous soever the bees in one swarm may appear to be, they all originate from a single parent, the Queen Bee, (see 924, and fig 2nd, plate 6). It is indeed surprising, that one small insect should, in a few months, give birth to so many young; but, on opening her body at a certain time of the year, eggs to the number of many thousand are to be found contained in it.

The queen is easily distinguished from the rest by the size and shape of her body. On her depends the welfare of the whole community; and by the attention that is paid to all her movements, it is evident how much they depend upon her security. She is seen, at times with a numerous retinue, marching from cell to cell, plunging the extremity of her body in each of them, and leaving in each an egg.

A day or two after this egg is deposited, the grub is excluded from the shell, having the shape of a maggot rolled up in a ring, and lying softly on a bed of whitish coloured jelly, on which it begins to feed; the common bees then attend with *astonishing tenderness* and anxiety: they furnish it with food, and watch over it with unremitting assiduity. In about six days, the grub arrives at its full growth, when its affectionate attendants shut up the mouth of its apartment with wax, to secure it from injury. Thus inclosed, it soon begins to line the walls of its cell with a silken tapestry, in which it undergoes its last transformation.

The working bees (see 925, also fig. 3rd, plate 6th) in a hive amount to the number of from 16,000 to 30,000. These are armed with stings, and form the only labouring part of the community. It is pleasant to see them in the act of collecting the mealy dust of flowers for the basis of their wax. They roll themselves in the flower-cup, the dust of which adheres to their hairs; then bringing their feet over their bodies, they fill with it two small baskets or cavities edged with hairs, appended to their hind legs. As soon as a bee thus laden appears near the hive, others go out to meet it, and taking the dust from its legs, swallow it; their stomachs being the place where it is converted into genuine wax. This operation being over, each individual disgorges it in the consistency of dough, and then moulds it into proper form.

The male bees are called *drones*; (see 923, and fig. 1st, plate 6th) they are unarmed; and are always killed by the workers about the monh of September.

Heat is the life of these insects. The least degree of cold benumbs them; and in winter, unless they are all crowded together, they perish. Their enemies are the wasp and the hornet, who with their teeth rip them open to suck out the honey contained in their bladder. A sparrow has also been seen with one in its bill, and one in each claw.

There is so great a degree of attachment subsisting between the working bees and their queen, that if, by any accident, she is destroyed, the labours of the community are at an end, and the rest of the animals leave the hive and disperse. If however, another queen be given them, joy springs up, and they crowd around her, and soon again apply to their operations. Even the prospect of seeing a queen will support them; this has been proved by giving to a hive that lost its own queen, the chrysallis of another. If a queen be taken from a hive, and kept apart from the working bees, she will refuse to eat and in the course of for or five days, she will die of hunger.

The engraving (fig. 4th, plate 6th, also article 926) gives representations of the royal cell of a queen Bee, which has been opened; it will be seen that it is widely different from all the other cells; *see a new way to destroy bees, article* 93; also contrivance for watching the swarming of bees, 556, and an American method of preserving bees in winter, 696.

928. OF CUPS AND BALLS.—The exibition of *cups* and balls is often mentioned in the works of the antients, as being among the most common art of the jugglers. (It is a very innocent amusement). It consists in conveying speedily, and with great dexterity, several *light balls* (see 719) according to the pleasure of any person in the company, under one or more *cups*; removing them sometimes from the whole, and re-conveying them back again in an imperceptible manner. (Whilst doing this the juggler makes use of various motions and cant phrases to divert the attention of the simple spectators from too narrowly observing his movements). In general, three leaden or tin cups are used, (see 667, also plate 3rd, fig. 1st) and as many balls, (and to prevent all discovery by their slipping from the thumbs of the juggler, or making a noise, as they must be laid hold of with much quickness), the table upon which he performs must be covered with a dark coloured woolen cloth.

929. HOW TO PASS THE BALLS THROUGH THE CUPS.—Having provided yourself with a *stick*, (see 667 Jacob's Staff!!) to shew your wonders with, and *four* small balls, as recommended 719, (sometimes small *cork balls* are substituted) you are then prepared for the performance of this recreation, but be sure that you do not let any more than three of the balls be seen (at one time). You now lay three balls upon the table, and say, "Gentlemen, you see here are three balls and three cups, that is, a cup for each ball, and a ball for each cup." Then taking the ball which you have in your

right hand, see fig. 6th, plate 3rd, (which you are always to keep private), clap it under the first cup; then take up one of the three balls with your right hand, seem to put it into your left, but still retain it in your right, shutting your left in due time, and say, *Presto, begone.*

Then take up the second cup, and say, "Gentlemen, you see there is nothing under this cup," so setting it down, clap the ball under it that you have in your right hand, and then take up the second ball with your right hand, and seem to put it into your left, but still retain it in your right, shutting your hand in due time, as before, saying, *begone.*

Then taking the third cup up, say, "Gentlemen, you see there is nothing under my last cup," then clap the ball in your right hand under it, and take the third ball up with your right hand, and seem to put it into your left, but still retain it in your right, shutting your left hand as before, saying, *Presto, make haste;* so you have your three balls come under your three cups, and one ball still in your hand, unknown to the company.

930. THE MAGIC BATON—DIVINING ROD.—This is an improved form of Jacob's staff, 667, it has a canal through its whole length of about three-eighths of an inch in diameter, in order that a small ramrod, *c*, of the same length may run freely through it, and this ramrod should be terminated by a small button, *d*, (see fig. 1st, plate 4th). By means of this simple staff, many surprising *feats of legerdemain* are easily performed.

931. *How to make effigies in glass, or likenesses of our friends, with their own identical bones, whereby a gallerg of family likenesses may be formed at little expence.*—First *calcine* our friends' bones, then digest these calcined bones for 70 hours in half its weight of sulphuric acid, evaporate to dryness, and wash with many waters till all that is soluble is procured, which will be known by the water wanting a *yellow tinge.* Let these different washings be put together, and evaporated to solidity. Then to seperate the sulphate of lime, dissolve in a very small quantity of water, and filter, and the sulphate of lime will remain on the filter. Now put this extract in a large crucible, and urge the fire till a milky white coloured glass settles at the bottom; this should be cast into a proper mould representing the likeness of the individual, from whose bones the glass had been made, the skeleton of a man weighing 19 pounds, will give 5 pounds of glass, which will not be altogether a *pigmi* of a likeness.

932. TO MAKE HYDROGEN GAS BURN WITH A CLEAR WHITE FLAME LIKE OIL GAS.—Dr. Hare of Philadelphia in 1820 discovered that a small quantity of oil of turpentine added to the ingredients for forming Hydrogen gas, (see 6) will cause it to burn with a light resembling oil or coal gas.

933. A CEMENT TO WELD STEEL WITH, AT LITTLE MORE THAN RED HEAT.—Melt borax in an earthen vessel. After it is melted, add one-tenth part muriate of ammonia, powdered, and when all is melted together, pour it out, and it will form a glass; let this glass be powdered, and mixed with an equal quantity of quick-lime, and it is fit for use.

934. *Article 5th, on the Art of Swimming*—RULES FOR LEARNING TO SWIM.—Nothing gives more confidence in water, than the knowledge of being able to make progress in it. I will notice a few errors which beginners often fall into. One error is, the separating the hands *too far*, as moving the hands outwards neither propel the body forward, nor yet keeps it up, and wastes the strength more than any thing else. Again, if the hands are brought too far back, the advantage gained is lost again in bringing them forward. Another great error is a too rapid motion of both hands and feet, so that progressive motion forward is almost altogether destroyed. To remedy these defects, the spring forward of the swimmer should be quick, to give the body an impulse forward, then to remain a moment in that *quicsent position*, to allow the full effect of the stroke and spring forward to be complete; because if the feet are drawn too soon in, the *thighs* oppose a large surface to the water, and stop the motion forward, and also tends to draw the swimmer's head below the water, the hands and feet should be drawn slowly up with the palms undermost; and to raise the head, press the *palms* downwards. They then form a fulcrum for to raise the head upon. By adopting these simple rules, any person may learn to swim with great ease in two or three trials.

935. THE IMMENSE COMET OF 1680, WHICH CAUSED NOAH'S FLOOD.—In the year 1680 an *immense comet* approached very near our earth's *orbit*, which, according to Sir Isaac Newton's calculation, travelled through space at the extraordinary speed or velocity of 800,000 miles an hour. The period of this comet in its orbit is about 575½ years, and if we count backwards from 1680 for seven revolutions, we shall find that its period of seven revolutions would just be exactly 4028½ years, which was just the year of the *Universal Deluge*, because, according to chronology it took place about 2349 years before Christ, and as 1680, the year of its last appearance after Christ, added to 2349 years, the time of the deluge before Christ, gives a sum of 4029 for the period of seven revolutions of 575½ years each; there can, therefore, I think, be no doubt, after such a near approximation to the same year, but that the comet which appeared in 1680 was the identical comet which caused the deluge 4029 years ago. In this particular instance, therefore, there is a remarkable coincidence of the records of the physical phenomina of nature, with the historical records of the Bible; where such a happy agreement exists, there can be no *quibble*.

936. **Method of making Storm Glasses of the same nature as those sold by Opticians.**—Take two drachms camphor, half a drachm purified nitre, and half a drachm muriate of ammonia; and let them be powdered and dissolved in two ounces of proof spirits; then put this mixture into a tube of glass shut at the lower end, and covered with a piece of pigs bladder at top, which membrane must have a hole pricked in it with a pin. The glass tube or long phial should be ten inches long, and three fourths of an inch in diameter. The changes which occur from this composition when left at rest, are said to be the following, which are supposed to indicate the changes of the weather:—If the weather promise to be *fine*, the solid matter of the composition will settle at the bottom of the glass, while the liquid will remain transparent above. But previous to a change to rain, the solid matter at bottom will gradually rise, and small stars will be observed moving and floating about, whilst the fluid will still remain pelucide. Before a storm or very high wind, (twenty-four hours) part of the substance will be on the surface, in the form of a leaf, and the fluid in such a case becomes very thick, resembling fermentation. If you wish to ascertain from what quarter the wind will blow, you will find the solid particles adhere more closely to the bottom on the side opposite to that from which the tempest will come.

Note. In winter, small stars being in motion, the composition is remarkably white, and somewhat higher than in summer, more especially when snow or white frosts prevail. In summer, on the contrary, if the weather be hot, mild, and calm, the substance subsides closely to the bottom of the glass tube.

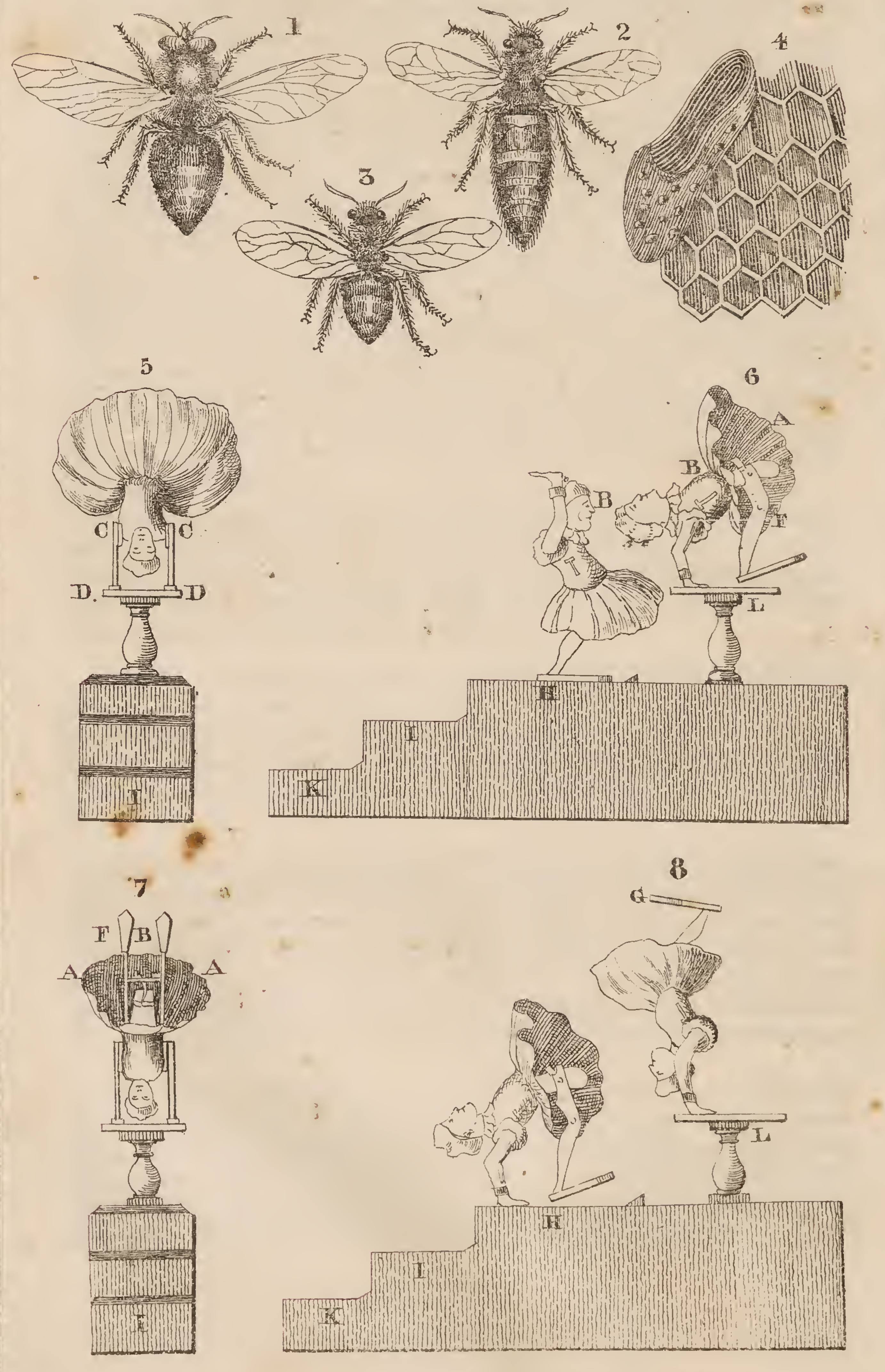
937. **TO MAKE A CHEAP AND GOOD JEWELLER'S ROUGE**, at 4d. per pound. Take Venetian red, (see 756) and powder it very fine, or it may just be as convenient for the person using it, to rub his brush on a piece of it. Enough will generally come away to suit the purpose. Jeweller's rouge is generally sold at 4s. a pound.

938. **HOW TO MAKE BARS FOR MAGNETS.**—These bars should be made of hard steel, and well polished, their angles should be sharp, and their several parts perfectly flat; and for experimental purposes they may be made about five inches long, half an inch broad, and a quarter of an inch thick; and there should be a line indented on one side of each bar, next one of its ends, to distinguish the north pole from the south, when magnetizing and afterwards.

939. **How to convert a bar of Steel into a Magnet.**—A bar of steel may be converted into a magnet; thus, lay the bar of steel upon a table, and simply take a magnet, and apply its north pole to that end of the steel which is required to be the south pole of the bar, viz. that end which is not marked, and draw the magnet gently but firmly along the bar to the end of it, and carry the hand

Plate 6. Page 217.

The Chemical Experimentalist.



onwards to a foot in distance from the bar, before you return to repeat the same process again. Several strokes in the same direction, are required to convert a bar into a magnet, always observing the same rules, to press gently while drawing the magnet along the bar, and continuing to carry the hand away every stroke (in the same direction) at least one foot.

940. HOW TO PRESERVE MAGNETS.—When bar magnets are laid past for a time, they should be laid in a box with the *opposite poles* in contact, and they must be kept dry, because if magnets get oxidated, (*rusty*) they are spoiled, and the same happens if similar poles are laid together. *To be continued.*

941. To make artificial Coral for Grottos.—Take of fine red vermillion two drachms, and of clear rosin, one ounce, and let them be melted together. This is the composition with which, if any thing is coated, it will give it the appearance of coral. Twigs of coral for grottos may be made very easily by peeling and drying branches of black thorn, and painting them over with this mixture while hot, afterwards hold them over a gentle fire, and turn them round till they are perfectly covered and smooth; white coral may be imitated with white lead, aad black coral with lamp black.

942. THE BOLOGNA PHIAL.—This is a phial made in the ordinary shape, and as suddenly cooled in the air as possible, with the bottom a great deal thicker than usual (the thicker the better). This phial will withstand a pretty hard blow outside with a hammer, or a leaden bullet may be dropt inside, and the phial remain uninjured. But if merely a particle of angular sand be dropt within it, it will pass through its bottom, sending it to atoms, with apparently as little resistence as would be offered by a spider's web.

943. *How to polish Plate Glass, being a very simple process, whereby many old looking-glasses may be cleaned of the erosions by time, and made as good as new.*—Prepare a polishing instrument by covering a piece of wood with many *plies* (folds) of woolen cloth, having some carded wool interposed between each fold, it will thus form an elastic cushion, for working with. Now bed the plate of glass in plaster upon a table, and having filled this polishing instrument, by means of a brush, and covered it with *colcothar* or *crocus martis* (see 514), rub backwards and forwards on the plate, piece by piece till the whole is polished; if you have many small pieces to polish, it would be troublesome to do each singly, lay them on a flat table, and pour plaster of Paris over them; then turn the whole upside down, and the whole may be ground together, and although the plates were of unequal thickness, they will thus be all level.

Stuart's Useful Information for the People, No. 32,

Being No. 2 of the

PANORAMIC DICTIONARY.

944. ACIDITIES IN THE STOMACH.

The stomach, *c d*, in its situation may be seen article (909, engraving, abdominal viscera). *C* is what has been called the *cordial* extremity, and *d* has been called the *pyloric*. It is at the extremity *c*, where the food makes its entrance into the stomach, after passing down the œesophagus (*or gullet*). The extremity *d* is where the food, after being gastricized, (acted on by the gastric or stomach juice), makes its excit into the intestines; therefore so far as acidities of the stomach are concerned, we must in general look for their *immediate* cause within itself; every excess diminishes the amount of nervous influence transmitted to the stomach, and therefore weakens the digestive action. *Secondary causes* of disease in the stomach, may be found in diseases of the liver, (whenever there is a deficiency in the quantity or quality of the bile), also in the pancreas not giving the necessary supply of *pancreatic juice*. Scirrhus in the pyloric orifice, or outlet of the stomach, is very apt to give birth to acidity, and it is generally brought on in those who addict themselves to ardent spirits; there are also a great number of glands at this part of the stomach, which are liable to be affected by disease, and give rise to acidity (*in the stomach*). To make a long tale short, the most general cause of acidity in the stomach arises from a constitutional diseased affection of these glands, (which is very common in all persons afflicted with more or less of a scrofulous taint.

Reflection 1st. In acidity of the stomach, it is a very common practice to have recourse to *alkalies*, such as magnesia, soda, supercarbonate of soda, &c., to cure the disorder. These medicines, *no doubt*, generally give relief at the time, but in most cases, the symptoms recur with all their force after a very few hours, the reason of which is very obvious; they are but palliatives; these *alkalies* but *neutralize* the *acid* in the stomach, whilst the cause that originated the acid still remains in full force; therefore the rational and common sense mode of treating such a case, is to direct our attention to the cause of the acidity, as the acidity is not the disease, but only the symptom of disease, and the cause of this symptom must arise from a want of power in the stomach to controul the whole of the materials within it, and cause them to submit wholly to the process of *animating* digestion. The *surplus* therefore obeys the laws which regulate other bodies external to animal bodies, and the consequence is, that the *surplus ferments,* and the product is an acid. Now the reason why the stomach is unable to suspend the acid fermentation, is because there is a deficiency of the necessary secretions of the stomach (*of the gastrice juice for instance*) to keep the whole of the matters it contains, under the influence of the digestive *chemical-animalizing* process, and therefore arises the true source of acidity. Again, it will be proper to enquire what is most likely to be the cause of this deficiency of the natural secretions. Why it will in general be found to be a diseased enlargement of the lymphatic glands at the pyloric orifice of the stomach, or *scirrhus* (a cancerous hardening) of the same part. In constitutions which are not tainted with scrophula, the cause will in general be found to be scirrhus or a *tendency to scirrhus*: while in those of a scorbutic *diathesis,* it will in general be the lymphatic glands that will be found diseased and enlarged. The true way, therefore (from these data) to remove audity of the stomach, is to avoid those excesses that may have given rise to, or excited it, whilst, at the same time, such a constitutional *alterative* treatment shall be adopted, as shall remove the disease of the lymphatic glands, and thereby restore the stomach itself to a healthy state, when it will digest the whole of the aliment, and no more *acid will be formed.*

945. ACTS OF PARLIAMENT.

Laws in Great Britain made by *the few* to *coerce* the *many.* A *House of Commons* represents a constituency, who, in these islands are but a small fraction of the millions that are deprived of their *inalienable* RIGHT of possession and property therein, with one voice each in the choice of their representatives; and that House of Commons is in a great measure composed of *another fraction* of Britain's millions of inhabitants; namely, 4000 of an ARISTOCRACY.

Such is the *House of Commons!* and it is in this house alone so *constituted,* that a small fraction of the inhabitants—the constituency, have any *say* whatever. In fact, this very constituency, when addressing this house, are under the humiliating necessity, in order to be attended to, to fawn, and beg, and pray; and dare hardly presume to reason upon any matter. The *House of Lords* is another branch of the British Parliament. This House has no constituency whatever. The constitution and continuance of this House is from *everlasting to everlastng,* or so long as Peers shall have the power and will to procreate or generate. This House is accountable to no person whatever; at a single *volition* of its will it can arrest the other House in its progress, set its veto upon its *most mature deliberations,* and *needeth not* to care one *fig* for the will or wishes of either king, commons, or individual; it is all in all—self-existent—eternally self-constituted—the beings of which it is composed are not to be addressed as MEN but NOBLES! And when allowance has been given to address them by petition, it has always been under the restriction to begin and end the address, "as in duty bound, with humility and prayer."

Such are a few of the leading qualities of the *House of Peers?* The king is the third branch of the legistature—*he can do no wrong!* He is a king by divine right? Such are the different parts of the machinery for manufacturing ACTS OF PARLIAMENT. Acts of Parliament extend to the protection of the *lives* and *liberties* of fishes, with their offspring, whether in rivers, lakes, or seas, also to the fowls of the air, and their young; but, strange to say, at the same time, these same legislatures acknowledge that their powers do not extend to the protection of either the lives or properties of a million of *starving weavers* and their *starving offspring!* Such is a faint sketch of the powers of the British Parliament; and the extent of the operation of Acts of Parliament. In preparing an Act of Parliament, a bill, a scroll of the intended act is brought into the House of Commons, where it is *three several times* submitted to the scrutiny of its members, in the course of which scrutiny, a great part of all that is good is generally extracted from it, by those members who are sons of Peers, and who are generally *bored* into this house by their Fathers, the hereditary legislators of the other Houses, (for no other purpose). After it has been thus *pruned* in the Commons by these *young scions* of hereditary nobility, it is sent *up* to the LORDS, (their fathers), where it undergoes a second *pruning*, when it is again returned to the Commons, who in general bluster a little about *mutilations*; when a commission of the *hereditary expectant Peers* of the Lower House are sent to confer with their *dads* of the *Upper House*; when, of course, all is amicably settled. It is then presented to the king, (who can do no wrong), by whom it is signed. It is then called an Act of Parliament.

946. AFFINITY.

A proximity of relationship. The term affinity is used indifferently with attraction.

Affinity Compound—When three or more bodies, on account of their mutual affinity, unite and form one homogeneous body, then the affinity is termed compound affinity or attraction; thus, it a solution of sugar and water, be added to spirits of wine, these three bodies will form an homogenous liquid, by compound affinity.

Affinity Double—Double elective attraction. When two bodies, each consisting of two elementary parts, come into contact, and are decomposed, so that their elements become reciprocally united and produce two new compound bodies, the decomposition is then termed decomposition by double affinity: thus, if we add common salt, which consists of muriatic acid and soda, (see 101, Experimentalist, page 20) to nitrate of silver, which is composed of nitric acid and oxyde of silver, these two bodies will be decompounded; for the nitric acid unites with the soda, and the oxide of silver with the muriatic acid, and thus may be obtained two new bodies. The common salt and nitrate of silver therefore mutually decompose each other by what is called double affinity.

Affinity, Intermediate—Appropriate affinity. Affinity of an intermedium is, when two substances of different kinds, that shew to one another no competent affinity, do, by the assistance of a third, combine, and unite into an homogeneous whole: thus, oil and water are substances of different kinds, which, by means of alkali, combine and unite into an homogeneous substance: hence the theory of lixiviums, of washing, &c.

Affinity, Reciprocal—When a compound of two bodies is decomposed by a third; the separated principle being in its turn capable of decomposing the new combination: thus, ammonia and magnesia will separate each other from muriatic acid.

Affinity, Simple—Single elective attraction. If a body, consisting of two component parts, be decomposed on the approach of a third, which has a greater affinity with one of those component parts than they have for each other, then the decomposition is termed decomposition by simple affinity; for instance, if pure potash be added to a combination of nitric acid and lime, the union which existed between these two bodies will cease, because the potash combines with the nitric acid, and the lime being disengaged, is precipitated. The reason is, that the nitric acid has a greater affinity for the pure potash than for the lime, therefore it deserts the lime, to combine with the potash. When two bodies only enter into chemical union, the affinity, which was the cause of it, is also termed simple or single elective attraction; thus the solution of sugar in water is produced by simple affinity, because there are but two bodies.

947. AIR.

Common air. Atmospherical air. The word air seems to have been used at first to denote the atmosphere in general; but philosophers afterwards restricted it to the elastic fluid which constitutes the greatest and the most important part of the atmosphere.

Air is an elastic fluid, invisible indeed, but easily recognized by its properties. Its specific gravity is 4 to 816 times lighter than water. One hundred cubic inches of air weigh 31 grains troy. But as air is an elastic fluid, and compressed at the surface of the earth by the whole weight of the incumbent atmosphere, its density diminishes according to its height above the surface of the earth. Its density decreases in a geometrical progression, while the heights increase in an arithmetical progression. Its specific caloric, according to Crawford, is 1·79, that of water being reckoned 1.

Although the sky is well known to have a blue colour, yet it cannot be doubted that air itself is altogether colourless and invisible. The blue colour of the sky is occasioned by the vapours which are always mixed with the air, and which have the property of reflecting the blue rays more copiously than any other. This has been proved by the experiments which Saussure made with his cyanometer at different heights above the surface of the earth. This consisted of a circular band of paper, divided into fifty-one parts, each of which were painted with a different shade of blue; beginning with the deepest mixed with black, to the lightest mixed with white. He found that the colour of the sky always corresponds with a deeper shade of blue, the higher the observer is placed above the surface; consequently, at a certain height, the blue will dissapear altogether, and the sky appear black; that is to say, will reflect no light at all. The colour becomes always lighter in proportion to the vapours mixed with the air. Hence it is evidently owing to them.

The property which the air has of supporting combustion, and the necessity of it for respiration, are too well known to require any description.

For many ages, air was considered as an element, or simple substance. For the knowledge of its component parts, we are indebted to the labours of those philosophers in whose hands chemistry advanced with such rapidity during the last forty years of the eighteenth century. For further particulars, see 168, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, Experimentalist, pages 33, 34, 35, 36.

948. ALE CORDIAL—KING WILLIAM'S POSSET.

Warm a pint of milk with a bit of loaf bread in it, and then warm a pint of ale with a little sugar and nutmeg. When the milk boils pour it upon the ale; let it stand a few minutes to clear, and it will make a fine cordial.

949. ALE TO RESTORE THAT IS FLAT OR SOUR.

(See 88 Experimentalist, page 18).

950. ALE FROM MOLASSES.

(See 153 Experimentalist, page 30).

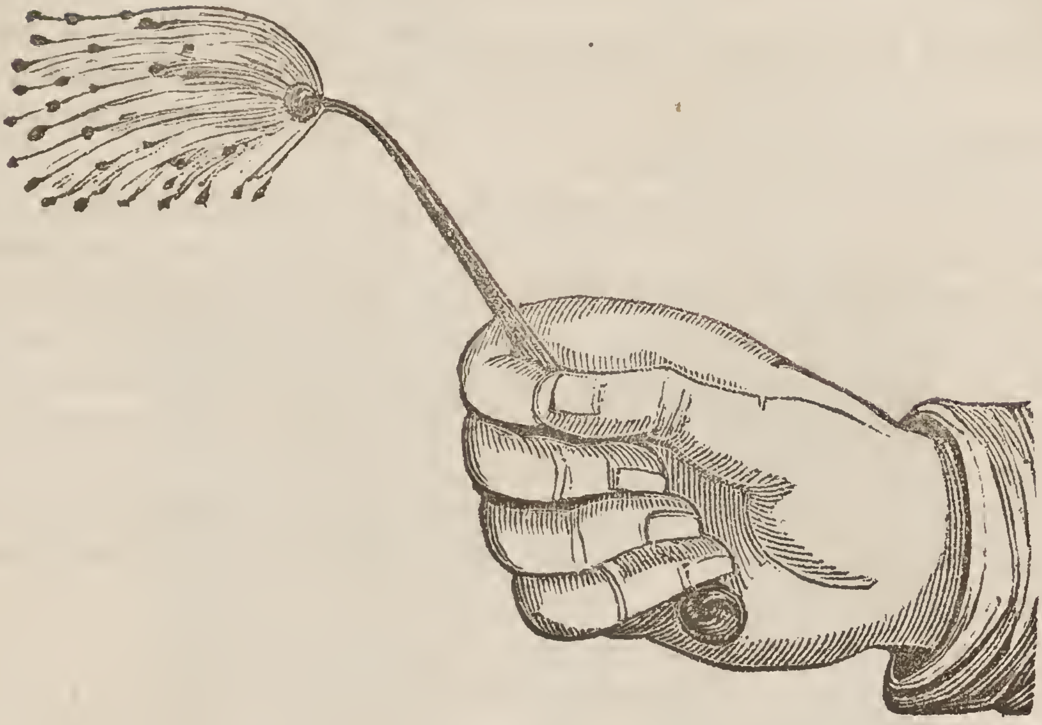
951. ALE FROM MALT AND MOLASSES.

(See 154 Experimentalist, page 30).

952. AMERICAN ESSENCE OF SPRUCE.

This valuable extract is obtained from the young *shoots* and *tops* of the pine or *fir-tree*, these are boiled in water till fairly dissolved (which is very easily done when they are young) the boiling is still continued till the whole has assumed the consistency of treacle or honey. The bark and softer part of the tops and youngest shoots, makes the finest essence. Both kinds when decanted and strained from the dregs are put up in bottles or casks for making spruce beer.

953. FIESCHI'S CAT-O'-NINE-TAILS.



954. At the moment Gerard was arrested, he had in his hand a weapon, that if he had not been wounded by the explosion, might have secured his escape. This weapon was a kind of cat-o'-nine-tails composed of a handle of about two feet, from which depended ten strong cords, and to the end of each was affixed a heavy ball of lead. In alluding to this weapon in one of his last examinations, he said, "If I had not been wounded, you would not now have me here. I had wherewithal to get rid of a brigade of police agents."

It has been asked how I could make it appear that FIESCHI'S INFERNAL MACHINE was an amusing machine, and how I could find a reason for placing it under the *head,* Scientific Amusements? to which I readily answer, "That the kings of France have long *amused themselves by killing their subjects.* I do not therefore see any more blame in the French killing their kings, than I do in their kings killing them. In the one case, hundreds of thousands of human beings perish, whereas in the other case, only a few pampered fools.

955. Description of the INFERNAL MACHINE, (921-2).—It is fixed upon a kind of frame supported by four posts, which with the transverse bars that secure them, are of good solid oak. Twenty-six gun barrels of the ordinary length are placed upon this frame, their *but*-end resting upon the hind ledge, which is seven or eight inches higher than the front ledge, in order to give a corresponding downward direction to the muzzles. The latter are fixed in separ-

ate grooves, cut in the front ledge of the frame, but not all on a level, some being deeper from a half to an entire inch than others, in order that the discharges might not bear all to one point, but take a more extensive range. By this arrangement of the barrels, their contents commanded a range of 25 feet in length of the cortege, and ten feet in height, that is to say, from the horses' hoofs to the riders' heads. By this contrivance the machine commanded a vast parallelogram, within which the king and his sons must have been at the moment of the explosion.

The gun barrels, placed as above described, were secured at their but-ends by a strong bar of iron, firmly screwed at each extremity to the frame. The barrels were placed with their touch holes uppermost, and on the same line, so that they might be simultaneously fired by a train of powder laid along them. By means of a screw that part of the machine on which the but-ends of the barrels lay, could be raised or depressed, so as to give a higher or lower direction as the cortege passed. The machine is about four feet long, and three and a half broad, and a little higher than the sill of Gerard's window.

THE PUZZLER.

956. How can you plant twelve trees in six rows, so as to have four in each row?

957. A Whig and a Tory dining together, the one provided five dishes, and the other three. A Radical happened to pass in, and requested to join them. On his departure, he gave the *Whig* who had provided five dishes, *five* shillings; and the *Tory* who had provided three dishes, *three* shillings; but the *Tory* was dissatisfied at this, and had the matter referred to a *modern* Solon, who instantly decided that the Whig who had provided five dishes, should have *seven* shillings, and the Tory who had furnished three dishes, should receive but *one* shilling; Where lies the justice?

958. THE CONJUROR'S PUZZLE.—How is it possible, with the greatest ease, and perfect certainty of success, to hold one body, (say a ball) in each hand, and then stretching your hands as widely separate as possible, to bring both of the bodies or balls into one of your hands, without allowing either hand to approach its fellow in the slightest degree.

Notice to Correspondents —"A. B. Distiller" has been received; his enquiries will require some consideration. "Glue Wáter" is informed that it is not the faults of receipts 142, 263, that he did not succeed in making Lucifers, as from these same receipts so many have made them (about Glasgow) since their publication, as has reduced their price from 6d. to 3d a box—*try again* "J. M'C. Greenock" his suggestions will be attended to *so far as possible*. "J. W." will find the information he asks about preserving birds for stuffing at (503). "CONFIDENCE" at Kilmarnock may confide, but persevere. "Orthodox" is informed if he will transmit a refutation of *Voltaire's Abraham* it shall be inserted; the editor is no Conservative, but an *out and out* Reformer.

Stuart's Useful Information for the People, No. 41,

Being No. 27, of the

CHEMICAL EXPERIMENTALIST.

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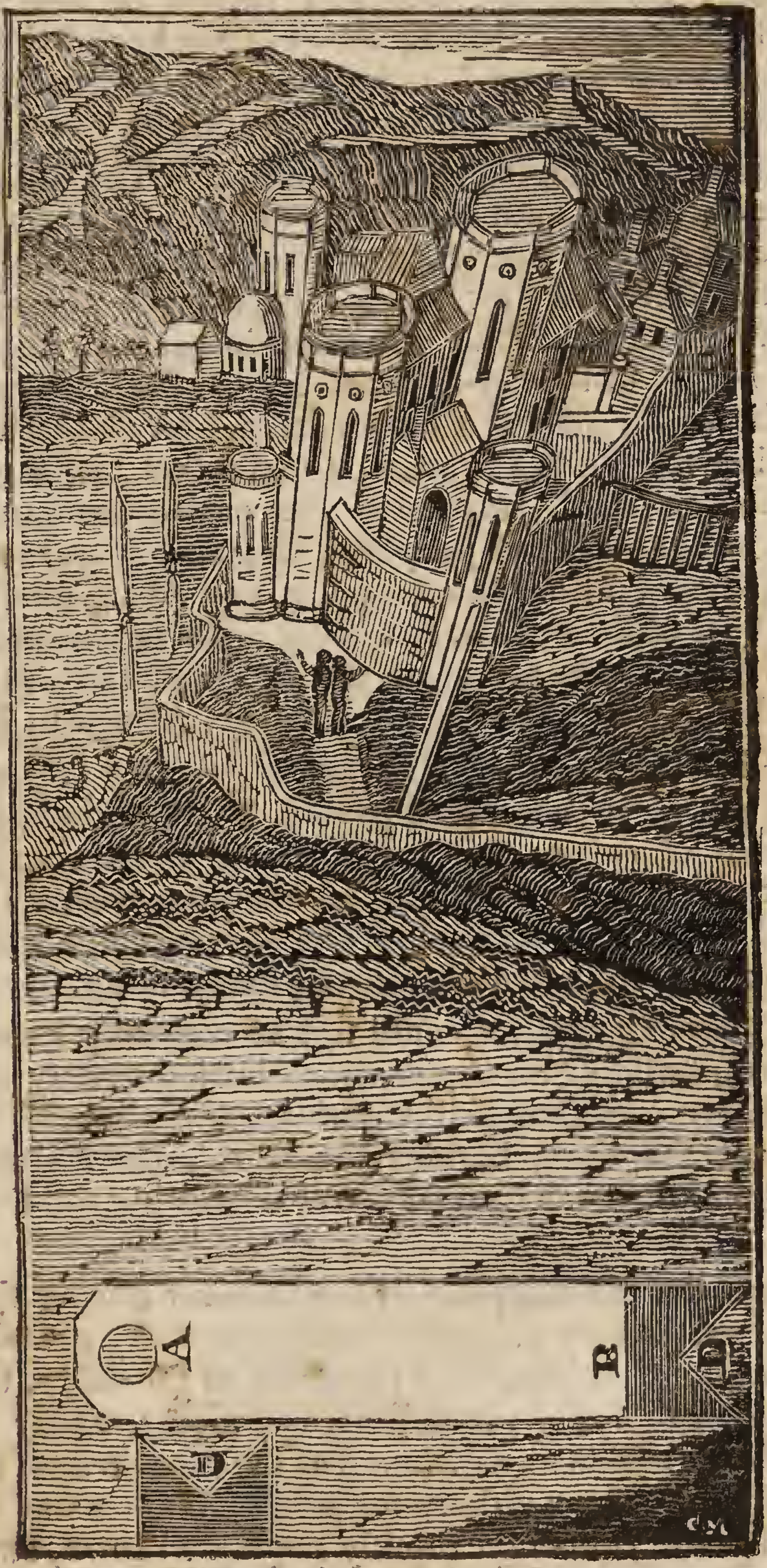
959. THE DISTORTED CASTLE.



960. DREADFUL EARTHQUAKE, and total destruction of the city of Conception and Talcahuana, and 25 to 30 towns, with other small villages, on the 20th day of February, 1835.—The following statement is by a gentleman who was an eye-witness:—

(From the Kingston Chronicle, July 6). "The morning of the 20th was clear and serene, but it will prove an ever-memorable day to the miserable people now inhabiting the border hills in this vicinity. The first shock commenced about twenty minutes past eleven o'clock, and lasted with but slight intermission for forty-seven minutes; causing the hills and valleys to rise and fall like the waves of the ocean. During the continuance of the first shock, which was the most severe, I expected to be destroyed every moment—it was almost impossible to keep upright.

"Talcahuana is completely demolished. The buildings were not only shaken down, but the ruins of houses, stores, &c. were completely swept away afterwards by the sea; which retired about fifteen minutes after the first shock, leaving the shipping entirely dry, at anchor in the harbour. It came in again in about ten minutes, to the height of twenty-five feet above the usual mark, overwhelming the whole place. Men, women, and children fled for the mountains, but many were overtaken and swept to the ocean by the receding waves, which completed the entire destruction of the town, depriving hundreds of people of their second garments—many who were in good circumstances, are now completely destitute. Furniture of all kinds was carried away with the houses—not even a living vestige remains to inform the owner of the situation of his former residence. It would require an eye-witness to be made acquainted with the complete destruction of the town by this calamity.

"Conception, a city containing about 25,000 inhabitants, is one complete heap of ruins—the houses being built chiefly of brick. There is but one solitary building left standing within the limits of the city, and for leagues around. The shock came from a south-east direction, and in its way destroyed every thing.

"The number of lives lost, could not be correctly ascertained. A new Cathedral, building in Conception, buried twenty workmen in its ruins. There were but two American ships in the harbour of Talcahuana at the time, besides the Coral, the Milton, and the Nile. A schooner was driven from her anchoring, and drifted over the town.

"The view from the shipping in the harbour during the different shocks is represented by an eye-witness as awfully grand and terrific. The unusual trembling and agitation of the ships, the convulsions and heavings of the mountains and plains, as far as the eye could extend, the sights at a distance of the awe-striken inhabitants fleeing, they knew not whither, for safety, the violent rushing of the waters over the ruins of a thickly populated town, sweeping the wrecks of the demolished habitations of the rich and poor, into one common chaos of ruin, was calculated to impress the mind of the beholder with wonder and astonishment at the power of an overruling and all-wise Providence."

"The shocks continued three or four every day up to the time the ship left. On the 22nd, a large portion of the island of Caracana, at the mouth of the Bay, was swallowed up. The 5th of March, it was stated there, that from twenty-five to thirty towns and provinces, besides many small villages and the Cordilleras, were scenes of complete ruin. From four to five hundred lives were lost just in that section of the country, but the extent of the suffering is not yet known; probably thrice that number have been buried in the ruins.

"The condition of the people who formerly inhabited spacious and convenient dwellings, where now not even a brick is left to mark the spot, is one of the utmost suffering. The poor people who lived in the country in small reed huts have suffered but little. Their houses withstood the shock, and to them is preserved a roof for shelter. Those who fled to the hills created little shantees on the spots of land least broken up, and were compelled to be constantly at work procuring the food necessary to satisfy hunger.

"The scene during the first shock was appalling. The trembling of every thing around, the boiling of the sea, as when water is heated over a fire—the earth opening wide, giving forth the most terrific moans, and labouring with internal fire—buildings tottering in every direction, and whole blocks of brick dwellings rocking to the foundation.

"When the first intimation of the breaking up of the convulsed earth was received by the inhabitants of the cities and towns, they, struck with horror, ran into the middle of the wide streets and knelt in fervent prayer to God, to save them from the threatening destruction. Our informant, who was among the number, says that he saw families run from their doors, and just as they left their thresholds, their buildings, mostly of brick, came tumbling down after them. It is a most fortunate thing for the people of the country that the shock came at mid-day. Had it taken place in the middle hour of the night they would have been compelled to flee for safety without even the one suit of clothes they now have, making their sufferings much greater.

"Conception, Talcahuana, Penco, Tome, Aranco, Colcura, Pernuca, Yumbil, Bere, Les Angeles, La Florida, Cœlumu, Ranquil, Canquences, San Carlos, Quirigue, were among the towns ruined by the awful event. Talcahuana, Penco, and Tome were thrice inundated by the sea, and in Aranco and Colcura it rose to the walls. The sea at the first-named place rose 33 feet above its ordinary level. The road from Talcahuana to Conception was almost destroyed by the deep fissures and sloughs which have been created, consequently the interruption of the channels of intercourse would still further increase the injury. The inhabitants, when the sea had resumed its level, returned from the heights, to which they had fled for protection, and were busily engaged in disinterring their property.

"Chilli has been subject to earthquakes ever since its settlement by the Spaniards. The city of Conception was originally built three leagues to the north of its present site, but having been twice destroyed by earthquakes, the inhabitants removed to the south, and built the city on its present location. Conception is represented by those who have visited it as a delightful place—the inhabitants high-minded, and honest in all the relations of life. A number of Americans, principally mechanics, have located themselves in the city. Talcahuana is situated in lat. 36. 52. N., long. 73. 06. E., being the port of Conception, and a place of considerable business. It has been the general resort of American whale ships for several years past, the harbour being one of the best on the coast.

"The town is situated almost on a level with the sea, large hills arising in the rear. It is a matter of history, that between the years 1720 and 1752, five great earthquakes occurred in Chilli. That on the 15th of March, 1657, destroyed a great part of the capital; that on the 18th of June, 1730, drove the sea against the city of Conception, and overthrew its wall; and that on the 26th of May, 1751, completely destroyed that city, which was again inundated by the sea, and levelled with the ground with all the fortresses and villages lying between lat 34. and 40. S. The shocks continued at intervals more than a month. Not an individual human life, however, was lost on this occasion, except some individuals who were drowned in Conception. In 1751, Conception was built on the north side of the river Blobia, about a league from the sea."

961. **ARTIFICIAL EARTHQUAKES and VOLCANOES** may be made as follows:—Mix ten pounds of sulphur and ten pounds of steel dust or iron filings; and after making it up into a paste with water, bury it in a large earthen vessel with a cover three or four feet under the ground. In ten or twelve hours after, if the weather be warm, the earth will swell up and burst, and flames will issue out, which will enlarge the aperture, scattering around a yellow and a blackish dust. It is not impossible, that what is seen here in miniature, takes place on a grand scale in volcanoes, as they furnish abundance of sulphur, and the matter abounds in metallic particles; for *iron is the only metal* which will produce an effervescence with sulphur, when they are mixed together.

962. **AN ARTIFICIAL VOLCANO.**—Grind an equal quantity of fresh iron-filings with pure sulphur, till the whole is reduced to a fine powder. Be careful not to let any wet come near it. Then bury about thirty pounds of it a foot deep in the earth, and in about ten or twelve hours the ground will heave and swell, and shortly after send forth smoke and flames like a burning mountain. If the earth happens to rise up in a conical shape, it will resemble Etna, Vesuvius, and Hecla in miniature.

Reflection—On earthquakes. In reflecting on these mighty internal convulsions of our earth, our reason in search for an adequate cause is confounded by the sublime, but appalling convulsive phenomina; it is brought to a stand, and feels nonplused in the attempt to account for those laws which regulate so stupendous a power, as shall, with one tremendous *roar* through nature's bowels, *rock* a whole country *to and fro*, heave mountains to the sky, and absorb whole islands in the sea. I do not see that I can well quit this subject, without quoting the following from "Tuolmin's Eternity of the Universe," *being the fifteenth section of that work.* The article has appeared very interesting to me, in illustrating the changes wrought on the face of nature by means of earthquakes, and I trust it will be found equally to interest my readers.

"Nor ought that appearance of the world, which is erroneously called the disordered face of nature, to escape our attention. The stupendous rocks, the mountains, as it were, cloven asunder, the shores of the ocean giving way, the adjoining waters unfathomable, are but so many striking monuments of those dreadful convulsions, which have ever agitated the globe. And whoever seriously considers the violent effects of earthquakes, recorded in the various annals of mankind, or those which have more recently occurred, never can be surprised at the ruins and confusion every where visible.

In the earthquake which destroyed Lisbon, in 1755, the mountains of Arabella, Estretta, Julio, Marvan, and Cintra, being some of the largest in Portugal, were impetuously shaken, as it were, to the very foundations; and some of them opened at their summits, split, and rent in a wonderful manner, losing huge masses which were precipitated into the adjacent vallies.

A fine stone quay, where the merchants landed their goods, and where, at the time, about three thousand people were assembled for safety, was turned bottom upwards; and it appears that the water, where the quay stood, is now an hundred fathom deep. In Morocco, the earth opened, and swallowed up a district, with all its inhabitants, to the number of ten thousand persons, together with tame beasts of all sorts, as camels, horses, horned cattle, &c.; and soon after the earth closed again in the same manner as before. The famous city Tasso was wholly swallowed up, no remains being left. One of the Sargon hills was rent in two; one side whereof fell upon a large town, where stood the famous sanctuary of their prophet, known by the name of Mula Teris; and the other side of the same hill fell upon another large town; and by this means both towns and inhabitants were all buried under the same hill. The earthquake was even more terrible in Barbary than in Portugal; at Mequinez, that part of the city where the Jews resided, was entirely swallowed up; and all the people of that sect, being about four thousand in number, perished, except seven or eight. And, however singular it may appear, it is an undoubted fact, that at the very time of this earthquake at Lisbon, the people working in the mines of Derbyshire were greatly alarmed by agitations of that district, and with explosions, as it were, of cannon.

In the year 1692, a great part of Port Royal, in Jamaica, was sunk by an earthquake, and covered by the water several fathoms deep; on the north side, above a thousand acres of land sunk. Some mountains along the river, betwixt Spanish Town and Sixteen Mile Walk, were joined together; and others so thrown on heaps, that people were obliged to go by Guanaboa to Sixteen Mile Walk. At Yellows, a great mountain split, and fell into the level, covering several settlements. Another plantation was removed half a mile from the place where it formerly stood. In Clarendon precinct the earth gaped prodigiously; and all over the islands there were many thousands of openings. But in the mountains were the most violent shakes, indeed, they were so strangely torn and rent, that they seemed to have put on different shapes from what they had formerly assumed; especially the Blue, and other mountains most elevated, which were the greatest sufferers. A large high mountain, near Port Morant, near a day's journey over, was quite swallowed up; and in the place where it stood, there is now a great lake. The Blue and its neighbouring mountains used to afford a fine green prospect; but at the conclusion of the convulsions, one half of them at least, seemed to be wholly deprived of their natural verdure. There one might have seen where the tops of great mountains had fallen, sweeping down all the trees and every thing in their way, and making a path quite from top to bottom.

The Pico in the Moluccas, accounted of equal height with that of Teneriffe, was sunk by an earthquake, quite swallowed up deep into the earth, and has left a lake in its place.

In the year sixteen hundred and forty-six, many of those vast mountains, the Andes, dissappeared, and were totally lost.

Such is but an imperfect description of those tremendous and violent operations of nature, which overthrow or absorb the cities of mankind, and shake the world itself! Happy visitations, could they but teach us lessons of humanity and beneficence, and thus sweeten the precarious moment of existence! Diseases and calamities incident to human nature, eruptions of volcanoes, the inundations of the ocean, and the convulsions and agitations of the globe, conspire to our destruction. The elements fight against us—should we then fight against each other, or contend for a spot that we enjoy but for a moment! For what stability is to be looked for in a world that trembles under our feet! In short, the vestiges of the earthquakes, and violent convulsions of nature, present themselves in every region. The shattered, but not disordered world, is the monument of their extended existence! And the strongest testimony of the eternity of the stars, and of the objects that compose the universe, or of an unbounded succession of events. What adequate idea can we form of that time, which has thus afforded an universal existence to revolutions and agitations of the globe, that make their dreadful appearance so rarely in the limited span of human existence! Agitations, indeed, which, though they thus strike the human race with panic and confusion, have their important uses and intentions. They destroy in order to preserve, they shake, but derange not the system of nature, which acts and perseveres in her eternal laws, revolutions and consistency, alike regardless of us and of our opinions.

Such, then, are nature's operations! And once more let us say, that as the vegetables flourish and decay, and men receive the spark of life, with which they triumph for a time, then fade and die, the earths are transitory, variable in their natures. They sometimes change to stone; the stone again is decomposed by air, or worn away by constant agitation; sometimes all are swallowed up and dissappear, or changed by fire, and by nature's hidden operations."

963. To make London Bookbinder's Paste, which excels all others for strength.—Add to three quarts of boiling water, two ounces of pounded alum. Then take a quartern of flour, and mix it to a batter with *cold water*; lastly, pour the boiling water, (with the dissolved alum) upon it, and stir the whole mixture till it boils.

Note. It is best to dissolve the alum in a kettle of boiling water, and having a pot ready with the flour in it, set it on the fire to boil up the paste in.

964. Composition to stain Glass, Orange Yellow.—Melt together in a crucible, two parts grain or virgin silver, with one part crude antimony; when cold, pound and sift. Then when used, mix with six times its weight of Venetian red, and dilute with cold water to the consistence of cream. *This stain is referred to at* 902, 903.

965. To avoid danger from Lightning while in a House.—During the time of thunder, avoid sitting near the chimney, a looking-glass, gilt pictures, or the wainscot; the safest place is in the middle of the room, (provided there be no metal lustre suspended above by a chain) and it is good to sit upon one chair, having the feet upon another; but it is still safer to lay two or three hair matresses in the middle of the room, and folding them up double, place the chairs upon them, and rest thereon yourself. You will in this situation be comparatively safe, for the chairs and bedding not being so good conductors as the walls, the lightning will not take an interrupted course through the air of the room and the bedding, when it can go through a continued and a *better conductor*, the walls. A hammock or swinging bed, suspended by silken cords, equally distant from the ceiling, walls, and floor, affords the safest situation a person can have in any room whatever; it in fact might be considered quite free from danger.

966. To make pictures of Birds with their natural feathers.—Take a well seasoned deal of wainscot, and paste white paper

on it. When the paper is dry, draw upon it an exact outline of the bird you mean to represent; next paint the ground work, say the stump of a tree, the bill, and legs of a proper colour, leaving the rest of the body to be covered with its natural feathers, and in the space you have left for the body to be covered by the feathers, lay on very thick gum water, repeating the coats as they dry till the gum is as thick laid on as the thickness of a shilling. In laying on the feathers, it is necessary to draw a camel's hair pencil dipped in gum water over the coat of gum you have laid on the paper, so that they more readily adhere, and in order that all may be done correctly, with a pair of pliers lay the feathers on as they are removed from the bird, in the very same situation on the picture, always laying a lead weight over the feathers as laid on, to keep them in their situation; and in order that they may adhere to the gum, it is necessary to shave or pare the shafts of the larger feathers, that they may lie flat. An eye painted on paper, or a glass bead will make a good substitute; lay a book, or a flat board over the whole to make it lie smooth.

967. DEXTERITY OF HAND, or what is called *Making the pass,* a card amusement.—Hold the pack of cards in your *right hand,* so that the palm of your hand may be under the cards; let the thumb of that same hand be on one side of the pack, the little finger between those cards that are to be brought to the top, and the rest of the pack with the first, second, and third fingers on the other side of the pack, from the thumb. The next thing to be done is to place the left hand over the cards in such a manner as that the thumb may be at C (see fig. 2nd, also fig. 1st, plate 5th) the forefinger at A, and the other fingers at B. Your hand being thus disposed, draw off the lower cards confined by the little finger and the other parts of the right hand, and place them with dexterity on the top of the pack, and you will have *made the pass.*

Fig. 1st.

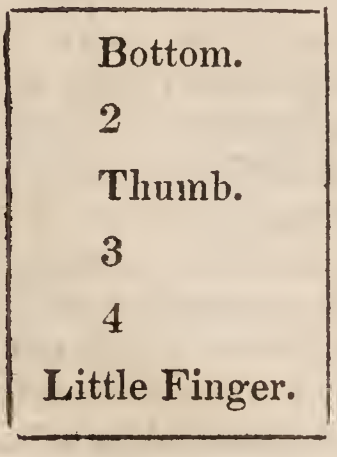
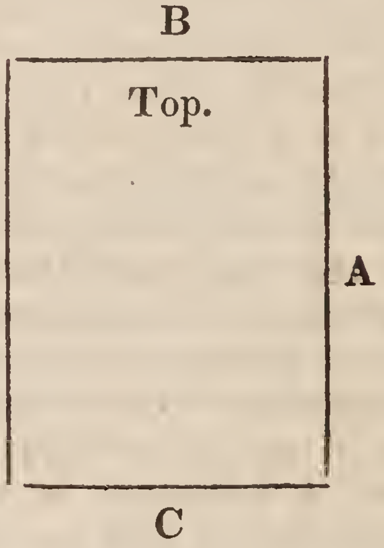


Fig. 2nd.



968. *To allow several persons to draw cards from a pack, which all being returned into the pack again without your seeing any of their faces, you may be able to shew each person his card again, (separately).*— Provide a pack in which there is a long card. Open the pack at that part where the long card is, and present the pack to a person in such a manner as he may naturally draw that card; tell him to look at it, then return it, and shuffle. You then take the pack from him again, and in the same manner offer to a second and third person, but take care they do not stand near enough to see each other's cards; then draw several cards yourself, among which is the *long card,* and ask each of the parties if his card be among the number, to which he will naturally say *Yes,* as they have all drawn the same card. You then shuffle all together, and always cutting at the *long card,* and shuffling again, present it before each person separately and distinctly, without allowing two to see it at once, saying, "That is your card."

Note. When you have not a pack with a *long card,* it may be performed by *making the pass.* Let a person draw any card, and replace it in the pack, but mind that you, at the same time introduce your little finger at the same place, and then *make the pass,* bringing that card to the top of the pack. Now shuffle, but keep sight of that card, then present *that card in the pack* again as before was done with the *long card,* so that a second, third, and fourth may draw it, always making the pass, and shuffling each time, and never letting any two persons see the card at the same time, but only the person to whom it it presented.

969. WONDERFUL NATURE OF LIGHTNING.—If two persons stand in a room and look different ways, and a loud clap of thunder happen, accompanied with zig-zag lightning, they will both distinctly see the flash at the same time, and every angle of its course will be distinctly visible to each of them; and if a third person were reading a book at same time, he also would distinctly see the very same form of the lightning between him and the book. This property is only peculiar to lightning.

970. REFRACTION OF THE RAYS OF LIGHT.—In the middle of an empty basin, lay a piece of money, say half-a-crown, and retire backwards from the basin, till the edge of the basin just hides the piece from your sight; now stand still and keep your head steady till another person gently fills the basin with water, and the money will then come distinctly into view, although the edge of the solid opague basin is interposed betwixt the piece of money and your eye.

871. TO MAKE ARTIFICIAL PORT WINE, *as prepared in Russia.*—Mix together three quarts of cyder, with one quart of French brandy, and one drachm of gum kino.

972. To prepare old Hock.—Mix three quarts of cyder with one quart of brandy, and then add one drachm of alkoholized nitrous æther.

973. *How to bend tubes with a large bore for chemical purposes, and at same time prevent the tube being straightened or perhaps closed at the bend.*—Seal one end of the tube hermetically, then soften it in the flame of a lamp for about two inches, where it is meant to take the bend; then while bending it, blow with the breath steadily into the open end, so that the perforation may not collapse during the process of bending.

974. How to Spin a Lump of Glass into threads of any length.—For this purpose merely soften the piece of glass with a blowpipe, then take another piece of glass, and apply to it, which, when drawn apart, will take with it a fine filament or thread, let the end of this thread be fixed to a wheel or reel, and keeping the piece of glass soft by the blowpipe; and you may with great velocity reel the whole piece of glass into one slender filament or thread.

975. MANNER OF IMPROVING AND MELLOWING WINE.—Put wine into a vessel of glass, and let it be secured on the top with a piece of *bladder*, and in the course of one month it will be equal to that which has been kept for one year. The improvements in quality are principally the following:—

1. It is neither *mouldy* nor *mothery.*
2. It becomes brighter, darker, and finer.
3. Its smell and flavour becomes stronger, and more enticeing.
4. Its taste, though more spirituous and aromatic, is still, milder, softer, mellower, and grateful to the palate.
5. Its proportion of alkohol becomes one half greater than that of ordinarily bottled wine of the same growth.
6. By this treatment of wine, it rids itself spontaneously of the superfluous course, sharp, sour salts, which are held in solution by the water. After undergoing this process, there is always a quantity of cream of tartar found subsided to the bottom of the glass vessel.

In short, by keeping wine in *casks,* the alkohol of the wine has a readier passage through the wood than the water, while fresh wine must be added to supply the waste, till the tartar becomes precipitated on the sides of the cask, while by this improvement although the alkohol should rise in *vapour* along with the water to the bladder, it cannot get through, but must fall down again to strengthen the stock, while the water escapes, leaving the tartar behind, which it held in solution, to fall to the bottom. Every person who loves a *drop of good wine,* should submit it to this cleansing, rectifying process, and then he will find it was no joke, with those who talked of quaffing Nectar like the *gods.* *(See another process, 466).*

Stuart's Useful Information for the People, No. 42,

Being No. 3 of the CE28

PANORAMIC DICTIONARY.

ANA

978. ANALYSIS.

Chemical analysis consists in the separation of two or more bodies which are held together by chemical union, such as potass and sulphuric acid, which, when united, forms the sulphate of potass, but when separated by *chemical analysis*, are known separately by their distinct *names* and qualities—sulphuric acid and potass. This kind of *chemical analysis* is called the proximate analysis, (meaning an approach to a perfect analysis) because although the sulphuric acid and the potass are separated, still the *sulphuric acid* and the *potass* are yet each of them compound in themselves, therefore each of them must undergo a further analysis; the *sulphuric acid* must be separated into *sulphur* and *oxygen*, and the *potass* into the metal *potassium* and *oxygen*, this is called "*the ultimate analysis*," by which chemists do not mean that the analysis is carried to the simple *principles* or *elements* of matter, but only that they have carried the analysis to the simplest forms of matter which they are conversant with, and that their knowledge of those laws which regulate the constitution of bodies, does not extend to the farther decomposition of the bodies under their consideration. Thus *air* was once supposed to be a simple *element*; it is now separated or analysed, and is found to be composed of two distinct gases, *oxygen* and *nitrogen*. *Water* was once *also* supposed to be another simple *element*, it is now found also to be composed of two gases, *oxygen* and *hydrogen*. At one time it was supposed there were but *four* simple elementary bodies; analysis has discovered fifty-four, and no chemist feels bold enough to assert that these may not, by farther research, be *farther analysed*.

POLITICAL ANALYSIS consists in distinguishing between two or more political bodies, which are held together, and which essentially form but *one body*, although distinguished by different names, such as *Whig and Tory*; WHIGS and TORIES are essentially but one body, although generally represented as *two*. It therefore becomes my duty, before proceeding farther, to state by what name the compound body shall be known. It is my opinion, then, that the name aristocrat, or an *aider* and *abettor* of the principles of the aristocracy, is applicable to either Whig or Tory.

It becomes then my next duty before proceeding farther, to say what an aristocrat is; to which I answer, he is one member of the 4000 families, who assume to themselves the privilege of *hereditary legislation* and *irresponsibility,* who claim the *right to govern,* tax, and *pension themselves* upon TWENTY-FOUR MILLIONS of Britannia and Hibernia's native born, and who have the effrontery to proclaim while exercising this unjustifiable and assumed *right,*

"CAN I NOT DO WHAT I WILL WITH MY OWN?"

The several male and female members of these 4000 aristocratic families, whose *blood* is NOBLE, when performing the sublime *act of procreation* are in all likelihood giving being to as many *hereditary irresponsible legislators,* who may, on some future day sit in judgment by *hereditary right* upon men whose hairs were already turned gray in the cause of humanity, before these aristocratic *imps* were either ——— or born. Such are the aristocracy, and whiggism and toryism is the *superficial analysis* of the term. The *proximate analysis* of toryism is a composition of *hereditary impudence* and *tyrannical irresponsibility*; impudent, because not only are they not ashamed of having pensioned themselves on the public, but would, from the public's long forbearance *with them,* insist to do so still; they are tyrannical, because they are irresponsible. Whiggism is compounded of a hereditary desire of office (viz. place and pension) and a playing at *fact and loose* with the country, to aid them in their nefarious ends. In short, Whigs and Tories have but one common *nucleus,* namely, 4000 of an assumed irresponsible *pensioned* aristocracy, who claim the *damnable* privilege to govern, tax, and pension themselves upon 24,000,000 of human beings. The ultimate analysis of both Whig and Tory, is the same—staunch supporters of the divine right of kings—the nobility of a particular blood—their ability to lay down the stock for a future legislature in the act of procreation, the same as a ship-builder may be supposed to lay down on the stocks the keel of a future 100 gun ship—that their estates should descend from generation to generation to all eternity in one branch of their family. That every person who doubts the soundness of the above paragraphs in their common creed, is a radical, and guilty of treason in his thoughts, and should be admonished to banish himself beyond seas, when he may be allowed to assume similar privileges himself, without being a pest to whig and toryism here. Such is a slight sketch of political analysis.

979. ANARCHY.

Confusion, disorder, tumult, a want of good government; such as, for instance, when a clergymen wishes to make a seizure of a *tithe-pig,* and the people are unwilling to give it up. He reads the riot act, and sets soldiers to shoot their fathers, mothers, and brothers, by dozens. Such is an instance of anarchy.

980. ANGEL.

"In Greek, a *Messenger.* It matters little to be informed, that the Persians had their Peries, the Hebrews their Malacs, and the Greeks their Demonot.

But what may, perhaps, be more interesting to know, is, that the supposition of intermediate beings between the Diety and us, prevailed among the first men: these are the demons and genii feigned by antiquity: man has always made the gods in his own likeness. As princes were seen to signify their orders by messengers, the Deity, of course, also despatches couriers. Mercury and Iris were celestial couriers and messengers.

The Hebrews, that chosen people, under the immediate guidance of the Deity itself, at first gave no names to the angels, whom God, after some time, was pleased to send to them; but, during their captivity in Babylon, they borrowed the names used by the Chaldeans. The first word we hear of Michael and Gabriel is in Daniel, then a slave among those people. Tobias, a Jew, who lived in Nineveh, knew the angel Raphael, who took a journey with his son, to help him in getting a sum of money due to him by Gabel, likewise a Jew.

In the Jewish laws, (in Leviticus and Deuteronomy), not the least mention is made of the existence of angels, much less of worshipping them; accordingly the Sadducees believed no such thing; but, in the histories of the Jews, they frequently occur. These angels were corporeal and with wings at their back, as the Mercury of the Pagans had at his heels. Sometimes they concealed their wings under their apparel. Bodies they surely had, for they ate and drank; and the inhabitants of Sodom were for abusing the angels who had come on a visit to Lot.

The ancient Jewish tradition, according to Ben Maimon, makes ten degrees or orders of angels: 1, the *Chaios Acodesh*, pure, holy; 2, the *Osimins*, rapid; 3, the *Oralim*, strong; 4, the *Chasmalim*, flames; the *Seraphim*, sparks; 6, the *Malacdim*, angels, messengers, deputies; 7, the *Eloim*, gods or judges; 8, the *Ben Elaim*, children of the gods; 9, the *Cherubim*, images; 10, the *Ychim*, animated.

The history of the fall of the angels is not to be met with in the books of Moses; the first word of it is in the prophet Isaiah, who, in a divine rapture, calls out to the king of Babylon, "What is become of the exactor of tributes? the fir-trees and cedars rejoice at thy overthrow. How art thou fallen, from heaven, O Helel, thou morning star!" This *Helel* has been rendered by the Latin word *Lucifer;* the appellation of *Lucifer* has afterwards been allegorically transferred to the prince of the angels who dared to make war in heaven; and lastly, *this* name, originally signifying phosphorus, and the dawn of day, is come to denote the devil!

The Christian religion is founded on the fall of the angels. The rebels were tumbled down from the spheres of bliss into hell, in the centre of the earth, and became devils. A devil tempted Eve under the figure of a serpent, and brought damnation upon mankind, till Jesus came to deliver them, triumphing over the devil, who, however still tempts us. Yet is this fundamental tradition to be found only in the apocryphal book of Noah, and there quite differently from the received traditions.

St. Austin, in his 109 letter, expressly attributes ethereal, or very thin bodies, both to good and bad angels. Pope Gregory II. has reduced the ten degrees of Jewish angels to nine choirs, to nine hierarchies or orders. These are the Seraphim, the Cherubim, Thrones, Dominions, Virtues, Powers, Principalities, Archangels, and lastly, the Angels, from whom the other eight hierarchies receive their appellation.

The Jews had in the temple two cherubims, each with two heads, one of an ox, the other of an eagle, with six wings; but, for some time past, they have been painted as a flying head, with two little wings under the ears, as angels and archangels are under the figure of young persons, with two wings at their back. As to the thrones and dominions, the pencil has not yet presumed to meddle with them.

St. Thomas (question 118, article 2) says, that the thrones are as near God, as the cherubim and seraphim, because it is on them that God sits. Scotus has computed the angels to amount to a thousand millions. The ancient mythology of good and bad genii, having spread itself into Greece, and so on to Rome, has there been sanctified, and to every man has been assigned a good and an evil angel; one assisting him and the other annoying him, from his cradle to his coffin: but, whether these good and evil angels continually shift stations from one to another, or whether they are relieved by others of their order is not yet known. Hereupon St. Thomas's Summary of Divinity may be consulted.

Neither is it exactly known where the angels keep themselves; whether in the air, the void, or the planets: this God has thought fit to conceal from us."—*Voltaire.*

981. ANGI'NA PE'CTORIS.

An acute constrictory pain at the lower end of the breast-bone, inclining rather to the left side, and extending up into the left arm, accompanied with great anxiety. Violent palpitations of the heart, laborious breathings, and a sense of suffocation. It is found to attack men much more frequently than women, particularly those who have short necks. In slight cases, and in the first stage of the disorder, the fit comes on by going up-hill, up-stairs, or by walking at a quick pace after a hearty meal; but as the disease advances, or becomes more violent, the fits are apt to be excited by certain passions of the mind; by riding on horseback, or by sneezing, coughing, speaking, or straining at stool. On a sudden, he is seized with an acute pain in the breast-bone, inclining to the left side, and extending up into the arm, accompanied by a sense of suffocation, great anxiety, and an idea that its continuance or increase, would certainly be fatal. In the first stage of the disease, the uneasy sensation at the end of the breast-bone, with the other unpleasant symptoms, which seemed to threaten a suspension of life by a perseverance in exertion, usually go off upon the person's standing still, or turning from the wind; but, in a more advanced stage, they do not so readily receed, and the fits are much more violent. The disease having recurred more or less frequently during the space of some years, a violent attack at last puts a sudden period to his existence. Angina pectoris is attended with a considerable degree of danger; and it usually happens that the person is carried off suddenly. It mostly depends upon an ossification of the coronary arteries of the heart.

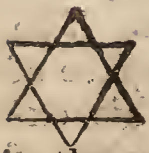
With the view of preventing the recurrence of the disorder, the patient should carefully guard against passion, or other emotions of the mind: he should use a light, generous diet, avoiding every thing of a heating nature; and he should take care never to overload the stomach, or to use any kind of exercise immediately after eating. Besides these precautions, he should endeavour to counteract *obesity*, which has been considered as a predisposing cause; and this is to be effected most safely by a vegetable diet, moderate exercise at proper times, early rising, and keeping the body perfectly open.

982. ANGLING.

In all kinds of angling there are some general rules to be observed which will conduce greatly to the angler's diversion, such as not to angle in cold weather, when the east and north winds blow, for it is a common observation, that the south wind is most favourable to anglers, except south west, and next to that the west. The usual months for angling are, from the beginning of May, to the beginning of September; when you angle before or after these times, the warmest part of the day is always best. On a hot summer day, early in the morning, and late in the evening, will be most seasonble, and likewise dark, cloudy, gloomy weather; nor will a gale of wind hurt your sport, if it does not bluster too much. In all sorts of angling, it will be best to keep out of the fishes' sight, and as far from the river's bank as possible, unless the water be muddy, and then you may come as near as you please. For the same reason, the angler's clothes should be of a dark grave colour, and not bright and glaring, for that would fright away the fish. To invite the fish to the place of angling, it will be proper to cast in suitable food, such as boiled corn, worms, and garbage; but to keep them together, it will be useful to throw in the grains of ground malt. But for salmon and trout, a composition of fine clay, blood, and ground malt will be best.

Improper times for angling are, in a strong east or a cold north wind, after a long drought, in the middle of days that are excessive hot and bright, especially in muddy or clear shallow rivers, when there has been a white frost in the morning, in days of high wind, where they have been long washing sheep, just after fish have spawned, and upon rising of any sudden clouds that prove to precede rain. *To be continued.*

SCIENTIFIC AMUSEMENTS.



983. SOLUTION OF THE PUZZLER, (956).—Plant one tree at each angle, and also at each point where the lines intersect each other as seen in the figure in the margin, and you will have planted 12 trees in 6 rows, so as to have 4 trees in each row.

984. SOLUTION OF THE PUZZLER, (957).—The Whig, Tory, and Radical's account was 24s. in the whole, because the Radical paid 8s. for his share, viz. 5s. to the Whig, and 3s. to the Tory; therefore, as the Whig and Tory had the remaining 16s. to pay equally between them, it follows that the Whig who provided five dishes at 3s. each, was 15s. from which deduct 8s. his own share leaves him 5s. out of pocket; and the Tory who had provided three dishes, was nine shillings, so that he had a claim on the radical money for one shilling.

985. SOLUTION OF THE CONJUROR'S PUZZLE, (958).—Take a ball in each hand, and stretch both your hands as far as you can from each other; then inform the company you will make both balls come into which hand they shall please to name. If any doubt your ability to perform the feat, you must lay one hand on the table, and keeping your arms still extended, turn yourself round and take up the ball with the hand that already contains a ball. Thus both the balls will be in one of your hands, verifying the conjuror's joke.

986. SUMMER BEVERAGE.—A scruple of the dried carbonate of soda, and 10 grains of citric acid, with a lump of sugar in a tumbler of water, will form a very agreeable effervescing draught, and be found highly gratifying in the heat of summer.

CONUNDRUMS.

987. Why is a man, making 100 per cent of his money, like Ireland?

988. Why is an egg underdone, like an egg overdone?

989. Where did Noah strike the first nail in the ark?

CHARADE.

990. My *first*, if you do, you won't hit it.

991. My *next*, if you do, you won't leave it.

992. My *whole*, if you do, you won't guess it.

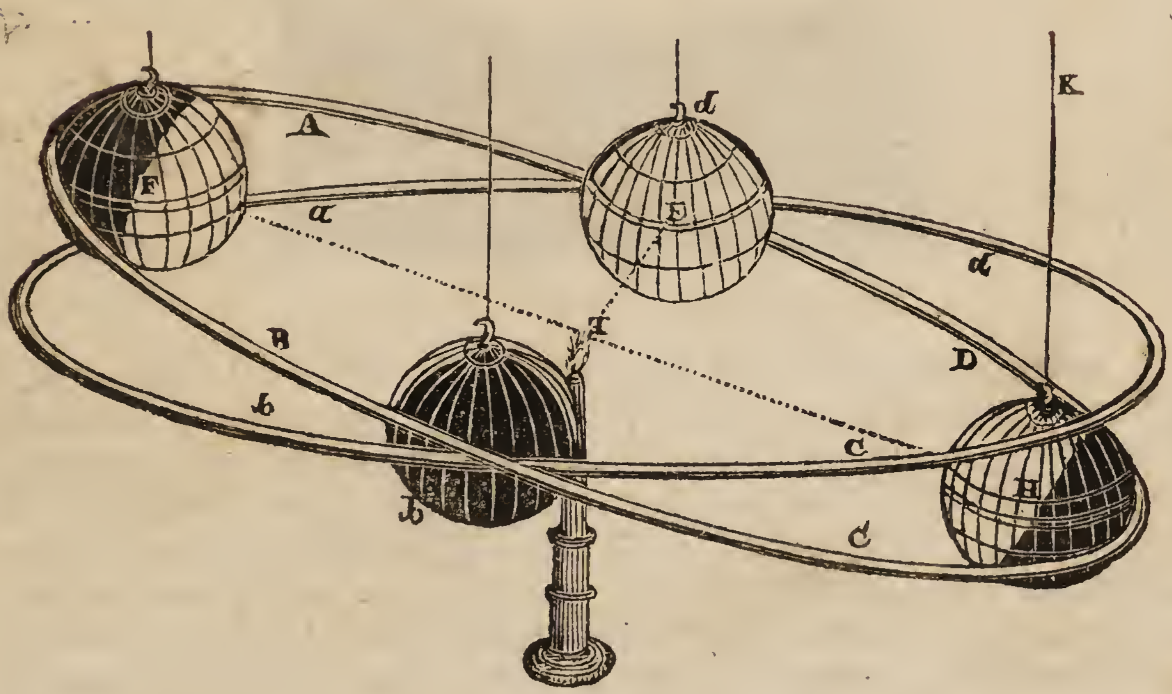
THE

CHEMICAL EXPERIMENTALIST,

OR,

An attempt to allure by Experiment,
AND GUIDE BY REASONING,
THE ENQUIRER AFTER
RATIONAL AMUSEMENT and USEFUL KNOWLEDGE,
Towards the cultivation of the simple and sublime Science—

CHEMISTRY.



BY JOHN KNOX STUART, M. D.

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on Cholera—"THE ARCANA OF LIFE,"—"THE REFORMER'S ALMANACK,"
"THE PANORAMIC DICTIONARY," &c. &c.

Decomposition is that death-like scene,
Where Nature's laws decree, incessant, universal change;
While Composition's generative womb,
Prolific, gives birth, new form of life, and re-creates the whole.

PART SIXTH.

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1835.

Stuart's Useful Information for the People, No. 43,

Being No. 28, of the

CHEMICAL EXPERIMENTALIST.

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994. Inflated Waterproof Girdle, for learning to Swim and Saving Life.

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995. PHILOSOPHY OF NATURE.—At the present time, when all has been led into a spirit of philosophizing, from watching and witnessing the return of that visitor of our earth, HALLEY'S COMET, my mind, amongst the rest, has been led into a train of reasoning very different in some of its details from any thing that has yet been proposed respecting the true and universal use of these excentric bodies. And as my deliberations thereon are pretty far advanced, although not yet perfected, I judge it right to submit them to the world, as a duty which I owe to my fellow-men for the enlargement of their understandings, provided my views should prove correct; and on the other hand, (if I should prove to be in an error) that my system of reasoning may be corrected. With the above simple reason for introducing to your notice the weighty subject of which this is the commencement, I shall submit no further apology, but will barely state that if my theory of the economy of nature shall be shewn to be untenable, I will cheerfully retrace my steps, and publicly renounce my error. More cannot be ex-expected. I declare myself open to rational conviction; and having pledged myself to that *amende,* I shall, fearless and regardless of antiquated dogmas, drive my *theory* of the *uses* of *comet*s with other mysteries in the *system of nature, roughshode,* over every obstacle that may present itself; and I shall watch its progress till it be received as truth, or condemned as error. It is now by chemical philosophers acknowledged that there is no chemical change takes place in nature, but there is also an electric *evolution,* or motion of electricity, therefore every change which takes place in any individual form in nature, should be considered as the death or extinction of that form, and the generation of a *new*; and as it is ob-

servable (in common language) that "all nature dies, and lives again," it becomes a subject of great interest to us, (as being parts of *dying nature*) to rightly understand "how nature may be said to die and live again."

On closely reflecting on this subject, it will be found that there is no such thing as *death*, or destruction of nature, but only regeneration—change; a change in the mode, quantity, or quality of electrical operation, which, progressing onwards, gives rise to new forms of being, and if there be any time when life may be said to be more active than at another, it is at that very time (commonly) called death—the change. Then electricity as a motive—living agent—is all *activity* and SOUL. In less time than is required to a single *volition* of thought, it disintegrates a whole world; one form of being disappears, and is immediately re-constituted into *one* or *more*. ALL NATURE, from the minutest atom, to the universal spheres, owns its *sole* reconstituting plastic energy, and groans in *thunder*, roars and heaves in *earthquakes*, or burst in fire and flame; sure *heralds* of the immediate, active *creative* operation of the *universal* SOUL; from the *eccentric* revolutions of the comets, from the rending of nature by earthquakes and thunder to the generation of animated life—all is electricity—all these operations are presided over, impelled, and guided by electricity—during *life* or the continuance of one form of being, its peculiar constitution is suitable for the *latent* operation of its peculiar motive form of electricity; but during the *change*, which is known as *death!* (not annihilation—nor destruction—but change.) This *latent* electricity is *set free*, and the consequence is, that that body in which it operated, (as isolated from the bulk of surrounding objects) is now said to be dead; and at the same time, the electricity which excited in it a *living form of existence*, becomes free, and in many cases becomes sensible to our senses; but it only becomes sensible to our senses, in the very living act of passing through some *stage of change*—in giving life and by its impression giving birth to new arrangements of matter, in which; it again becomes *latent* and *fixed* as the *moving soul* of its new creation.

Electricity is male and female, and every change of form of material existence is the effect of electrical operation, and every electrical operation communicates form *to* matter; and the male and female electricities, embracing each other, become latent or fixed therein, and sustains active existence under its particular forms, till disturbed or called into freedom by some *immediate demand* of nature.—I say all *forms* and *operations* in Nature, are the result of the conjoint actions of two kinds of electricity acting upon each other; viz. the MALE or *generating* electricity, upon the female or engendering electricity; which separate distinctions of electricity are known in science by the names of vitrious—or positive electricity; and resinous—or negative electricity, which vitrious or positive electricity corresponds with my male or generating electricity, and the resinous or negative corresponds to my female or engendering electricity. In taking this wide and *common sense* view of electricity in universal nature, I shall be able to give a more satisfactory account of the *uses of comets* than has hitherto been done. I shall also be able to account for many discrepancies that appear in the conjectures of both ancients and moderns, regarding the phenomena of generation. Not only shall I be able to state by what means generation is effected, but I shall also be able to account for those laws which regulate the fiat in the distribution of sex, in the generation of males and females.

This subject to be continued.

996. **THE DISTORTED CASTLE,** (see 959).—When viewed at any other but the correct point of sight, the designs appear to be a mere group of distorted objects; but when looked at correctly, have all the appearance of reality. As the effect depends entirely upon correctly placing the sight-piece, through which it is to be viewed, I have adopted a mode of describing it, which can scarcely be misunderstood. A piece of paper, or card, (which is better) must be cut out, of the precise shape and height of the piece A B D; an aperture for the eye, about the size of a pea (A) must be made, precisely on the spot shewn in the sight piece. The shaded part of the sight-piece must be folded back at a right angle, so as to form a kind of foot to stand upon. The sight-piece must then be placed perpendicularly, exactly over the place, D, that is, the shaded parts marked D, D, must coincide Then keeping the paper perfectly horizonal, and placing the eye close to the aperture, A, there may be seen a perfect representation of a castle, surrounded by scenery. A very little experience will give the image or model very exactly; if not, the person who makes the trial may depend upon it that he has not placed the sight-piece correctly.

997. **THE INVISIBLE VISIBLE.**—To make an object which is too near to be distinctly perceived, so as to be seen in a distinct manner, without the interposition of any glass. Make a hole in a card with a needle, and without changing the place of the eye or the object; look through the hole at the object, and it will be seen distinctly, and considerably magnified.

998. **To Dye Silk a Purple Colour.**—Take one pound of cuthbear, and four ounces of pearl ashes, and put them together on the fire, with as much soft water as will cover 24 yards of silk cloth; boil the cloth for half an hour therein; then take it out and rinse in cold water, and it is finished. By this simple process any person may dye a piece of cloth for as many pence as would cost as many shillings by giving it out, and the whole process is effected with as little trouble as it would take to rinse it out of cold water. Let every person who has an opportunity try the experiment, and they will clearly see the benefit.—Hodge.

999. To make any Bird appear as if dead.—Lay any bird on the table and wave a small feather over its eyes, and it will lye still as if dead, but by removing the feather it will revive again. Let it lay hold of the stem of the feather with its feet, and it will twist and turn about, and may be rolled about on the table at pleasure.—Hodge.

1000. Method of detecting Arsenious Acid, or Corrosive Sublimate, when in Solution.—Take a little recent wheat starch; add to it a sufficient quantity of iodine to give it a blue colour. Mix a little of this blue matter with water, so as to have a blue coloured liquid. If into this liquid a few drops of an aqueous solution of arsenous acid be put, the blue colour is immediately changed to reddish brown, and is gradually dissipated entirely. The solution of corrosive sublimate produces nearly the same effect, but if some drops of sulphuric acid be added, the blue colour is again restored, if it has been destroyed by arsenious acid; but if it has been destroyed by corrosive sublimate, it is not restored, either by sulphuric acid or by any other acid. (Brugnatelli, Ann. de Chim. et Phys. iv. 334.)

1001. TO PREPARE CHINESE CARMINE.—Twenty ounces of very finely-powdered cochineal are boiled with a pailful of river water, contained in a proper vessel; to which sixty grains of Roman alum are added. After seven minutes' ebullition, the boiler is removed from the fire, and the liquor put into another vessel, by means of a syphon: it may also be passed through fine linen. This liquor is to be preserved for use. A solution of tin is previously prepared in the following manner:—Ten ounces and a half of common salt (muriate of soda) are dissolved in a pound of aqua-fortis (nitric acid): to this solution, when cold, four ounces of Malacca-tin filings are added, by degrees:—a fresh quantity of tin must not be put in till the former is dissolved. This solution is added, drop by drop, to the heated cochineal liquid; and the carmine precipitates. When the carmine is deposited, the liquid is decanted; and the carmine allowed to dry in the shade, in China or Delft-ware vessels.

1002. Alloy for Anatomical Injections.—Take of bismuth, 8 parts, lead 5 parts, tin 3 parts, and mercury, a very small proportion, and it, when melted, is fit for use.

1003. The very best Type Metal.—Lead 4 parts, antimony 1 part, and a very little copper.

1004. Alloy for White Copper.—Copper, 10 parts, arsenic 1 part, when they are red, alloy together, it is white and clear like silver, but brittle.

1005. *An Excellent Bright Green Paint for 3d. a pound, ready to lay on, which the inventor challenges any colourman or painter to produce a green equal to it for eighteen-pence.*

112	lbs yellow ochre powder,	6	gallons	lime water,
168	.. road dust,	4	..	fish-oil, prepared,
112	.. wet blue,	7½	..	incorporated oil,
10	.. blue black,	7½	..	lintseed oil.

A *brighter* green may be formed by omitting the blue black. A *lighter* green may be made by the addition of ten pounds of white-lead, and a variety of greens by varying the proportions of blue and yellow.

Note. The wet blue must be ground with the incorporated oil, preparatory to its being mixed with the mass.—*Franklin's American Journal..*

1006. METHOD OF MEASURING THE SOLID CONTENT OF A CYLINDRICAL VESSEL.—Rule. Multiply the diameter of the cylinder by itself, and that product again multiply by the depth *in inches*, and decimal parts; lastly, multiply this last product by 0034, and from this product cut off as many figures as their are decimals in the whole, and the figures or whole numbers are gallons, and the decimals are parts of a gallon.

Example.—Suppose a cylindrical vessel to measure 21.5, say twenty-one inches and a half diameter, and the depth of the oil or other fluid is 76.25 inches, say 76 inches and a quarter.

Multiply 21.5
By itself 21.5

1075
215
430

46225
Multiply by the depth, 76.25

231125
92450
277350
323575

352465625
Decimal fraction, .0034

1409862500
1057396875

119.83831250

	Gallons.	Quarts.	Pints.
Answer,	119	3	0½

By this means any person can measure the contents of any cylindrical vessel, whatever it may be filled with; and if it should not be full, dip the depth of the fluid with a rod, and measure off the wet in inches.

1007. **Improved Melting Pots for Casting Iron and Brass.**—Take two parts of fine ground raw Stourbridge clay, and one part of the hardest gas coke, previously pulverized and sifted through a sieve of one-eighth of an inch mesh; mix the ingredients together, with the proper quantity of water, and tread the mass well; it is moulded by the hand in a wooden *core*, which must be covered with a cap of moistened linen to prevent the pot from sticking;—when it is taken off, form a lip for pouring out the melted metal, and dry the pot carefully by a gentle heat:—a pot to hold about twenty lbs. of melted metal may be afforded for about tenpence. Before using, it must first be warmed at the fireside, then laid into the furnace with its mouth downwards, (the red coke being previously covered with cold ones, in order to damp the fire); more coke is then thrown in till the pot is covered, and it is then brought gradually to a red heat; it is now turned into its proper position, and charged with cold iron, which is melted in one hour and a half, and no flux of any kind is used.

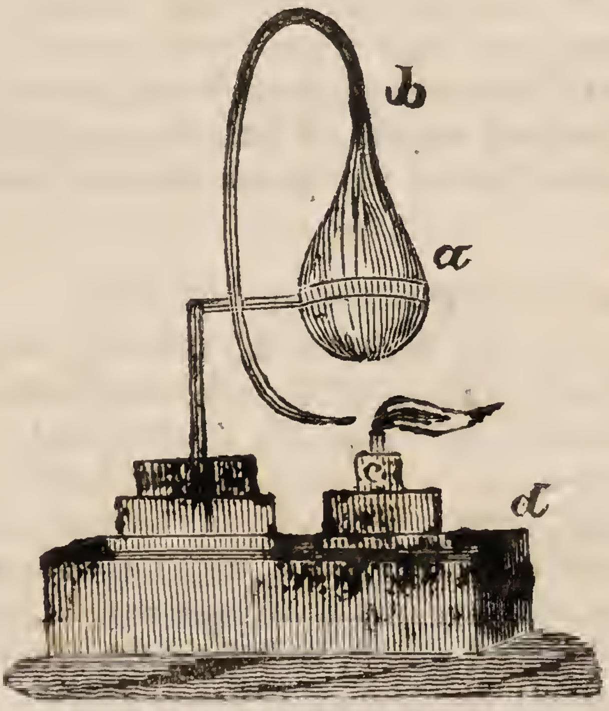
1008. **GANDER FISHING—as practised at Lochmaben, Dumfries-shire**—This mode of fishing is very productive, as well as entertaining, all that is required is to tie a line with a *baited-hook* to one of the legs of a gander, and then setting it down on its native element, suffer it to proceed on its voyage of discovery;—the bait will soon be caught by some greedy *pike*, or other fish, for which the bait may be most suitable, and all that requires to be done by the attendant *purveyor* is merely to watch when the gander has made a capture,—to relieve it from its prize, and supply a new baited hook.

Note. Ducks will suit as well as Geese, and an overseer could attend a whole drove of them as easy as one. It is said that this mode of fishing is successfully practised in a reservoir near Glasgow. It is farther stated that the sport is exquisite, when the fish is any ways large—even a large gander has been found screaming, and a pike pulling with all its might, the one attempting to fly, and the other to swim from the invisible enemy. And many a *somerset* has the feathered angler been seen to pass in the water, before it transported its finny prize to the shore.

1009. A MYSTERY UNVEILED.—"After looking through green spectacles for some time, white paper appears red, and after looking through red spectacles, white paper appears green." There are only three original colours in nature, blue, red, and yellow. All the rest are compounds: white is a mixture of all. Now, in looking long at the red, the eye becomes tired; so that when the white, which contains all the three, is presented to it, it abstracts or overlooks the red; and the blue and yellow alone being left, the paper appears green; for blue and yellow make green. So, after looking through green, it abstracts the blue and yellow (or green) from the paper, and red is left. On the same principle, if you look through yelllow spectacles, the white will afterwards appear purple; for blue and red, the complement of the yellow, make purple. After looking through blue spectacles, the white appears orange, or red and yellow; and so on. This is a law of nature, which leads to a knowledge of harmony in colours; blue makes the finest contrast to orange, and red to green.

1010. To unite broken Glass Tubes together for chemical and other purposes.—Heat their ends which are meant to be joined in the flame of a lamp, and then bring them into contact, and turn them round in opposite directions, with a screwing motion, in order to join them completely; there will now be a thickened ring of glass at the joining; if it is desired to be removed, one end of the tube must be sealed, and the glass being completely softened by heat, blow into the open end and gently pull the tube until the ring disappears, and the whole tube becomes equally cylindrical.

1011. A cheap Self-acting economic Blowpipe.



1012. The above is a very convenient apparatus for mending and performing experiments with—all that is required to mount it, is merely a Florence flask, *a*, in the neck of which, fixed in a cork, is the bent glass tube, *b*, which comes to a point at the flame of the lamp, *c*, which is mounted on the stand, *d;* by putting a little water in the flask, and by lighting the lamp, it will boil, and the stream which escapes will act on the flame of the lamp, *c*.

Stuart's Useful Information for the People, No. 44,

Being No. 4 of the

PANORAMIC DICTIONARY.

1010. ANGLING.

Continued from 982, *page* 239.

The days following dark, clouded, or windy nights. When rivers, especially small ones, are pent up by flood-gates or mills, and run low.

The proper times are in calm clear weather. In a brisk south or west breeze; if you can find shelter, no matter how high it be. When in the hottest months it is cool and cloudy. After floods, when the water fines, and is of a whey colour. After a hasty violent shower has a little muddled and swelled the tide, especially for ground-fishing. When a river is much swelled, and it runs violent in any still pit, then by its sides; the mouth of any slow creek running into it, and the ends of bridges where the water runs calm and quiet, if not too deep. There is admirable sport when flashes are let down, or mills set a-going, if you follow the course of the water.

Ant-fly is to be met with from the end of June to September. They are to be kept in a large glass bottle, with a handful of the earth, and another of the roots of grass from the ant-hills where they were bred. They are an excellent bait for roach, dace, and chub, if you angle with them under the water about a hand-breadth from the bottom.

Angling is described in general by Mr. Pope.

In genial spring, beneath the quiv'ring shade,
Where cooling vapours breathe along the mead,
The patient fisher takes his silent stand,
Intent, his angle trembling in his hand;
With looks unmov'd, he hopes the scaly breed,
And eyes the dancing cork, and bending reed.
Our plenteous streams a various race supply,
The bright-eyed perch, with fins of various dye,
The silver eel, in shining volumes roll'd,
The yellow carp, in scales be-dropp'd with gold,
Swift trouts, diversified with crimson stains,
And pikes, the tyrants of the wat'ry plains.

1011. ANGLING APPARATUS.

Fishing rods should be oiled and dried in the sun, to prevent their being worm eaten, and render them tough; and if the joints get swelled and set fast, turn the part over the flame of a candle, and it will soon be set at liberty. Silk or hemp lines died in a decoction of oak bark, will render them more durable, and capable of resisting the wet; and after they have been used, they should be well dried before they are wound up, or they will be liable to rot. To make a cork float, take a good new cork, and pass a small red-hot iron through the centre of it lengthways; then round one end of it with a sharp knife, and reduce the other to a point, resembling a small peg top. The quill which is to pass through it may be secured at the bottom by putting in a little cotton wool and sealing wax, and the other end is to be fitted with a piece of hazel like a plug, cemented like the other, with a piece of wire on the top formed into an eye, and two small hoops cut from another quill to regulate the line which passes through the float. To render it the more visible, the cork may be coloured with red wax. For fly-fishing, either natural or artificial flies may be used, especially such as are found under hollow stones by the river's side, on the trunk of an old oak or ash, on hawthorns and on ant hills. In clear water the angler may use small flies with slender wings, but in muddy water a large fly is better: in a clear day the fly should be light coloured, and in dark water the fly should be dark. The rod and line require to be long; the fly when fastened to the hook should be allowed to float gently on the surface of the water, keeping the line from touching it, and the angler should stand as for as may be from the water's edge with the sun at his back, having a watchful eye and a quick hand. Fish may be intoxicated and taken in the following manner. Take an equal quantity of coccolus indicus, coriander, fenugreek, and reduce them to a powder. Make it into a paste with rice flour and water, roll it up into balls as large as peas, and throw them into ponds or rivers which abound with fish. After eating the paste, the fish will rise to the surface of the water almost motionless, and may be taken out by the hand.

1012. ANIMAL HEAT,

And of the life of the blood, and whence derived.

The living principle, or principle of life, that vivifies or enlivens our blood, is in combination with the oxygen of our atmosphere, and the combination of that living principle with the oxygen, constitutes vital air, *i, e,* oxygen combined with electricity constitutes vital air, that vital air united to nitrogen or azote forms the atmospheric air. Now for it; the lining membrane of the lungs combines the oxygen of the atmosphere with the carbon or charcoal and hydrogen of the blood, and combining with the charcoal, it dissolves it, and forms carbonic acid—charcoal dissolved in oxygen; and another portion of the oxygen unites to the hydrogen of the venous blood to form water. The carbonic acid is thrown out of the lungs by a process called expiration, and the vapour, hydrogen is combined with oxygen is thrown off as vapour or steam, which is called the pulmonary exhalation. Thus the blood has got quit of two substances, that had, if I may use the expression, served their day and generation—charcoal and hydrogen; but there is something more that has taken place, it has acquired *caloric or heat** and moreover the living principle, viz. electricity—and that of the right kind too. It is well known to be a law in chemistry, that when any chemical change takes place, we have also an electric change, and if the new body be of a different density from those of which it is compounded, we have also a corresponding change of the states of heat, or caloric in this case. The chemical combination between the oxygen of our atmosphere, and the charcoal and hydrogen of our blood is effected by means of this membrane, and the charcoal and hydrogen are thrown out of the system by the act of expiration, and *heat* and new *electricity* are taken in and communicated to the blood, that blood; now freed from charcoal and hydrogen, and heated and vivified, enlivened or electrified, is gathered up from this extensive membrane, and returned back to the upper part of the left side of the heart by four *veins*, called the pulmonary *veins*. This upper part of the heart, called the left auricle, contracts and drives the blood down to the lower cavity of the left side of the heart, called the left ventricle; it in its turn contracts and propels the red, warm, decarbonized, dehydrogenized, and newly electrified blood to every part and system of the body, by means of hollow tubes, called ARTERIES, after the same manner as water or gas pipes convey their contents to every part of a great city. Thus life is disseminated through every interstice of the body, and the whole animal machine is enlivened and invigorated at every inspiration of the lungs, and by every pulsation of the heart. Truly we are wonderfully, gloriously, and beneficently made—so *admirably* is kindness and wisdom displayed in the constitution of our bodies, that the student of NATURE is in gratitude led to lay his hand on his bosom, and concentrating the emanations or emotions of his soul; enraptured he exclaims: ALL PERVADING POWER!—Benign intelligence! Thy will be done! Thy will be done!! Man lives at the bottom of a vast aerial ocean; this ocean, our atmosphere, surrounds this earth, and is charged with the electric or vital principle, and man has fifty yards of pulmonary membrane* adapted to the interior of his lungs, for the very purpose of receiving this principle of vitality, the true living food and support of his present existence, in reflecting on the above, as means to a merciful end. Once more, I cannot resist my desire to exclaim: man and all other animals, so far as I can see, are prodigies of an infinite, universal, and benign benificence.

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* RICHERAND'S *Physiology*, p. 195.

"The absorbtion of oxygen by the venous blood, explains how the phenomena of respiration are continued into every part of the body, and produce the warmth uniformly diffused over all our organs, in proportion as the blood parts with its caloric" or *heat*, "for which its affinity diminishes as it becomes venous; the parts which give out the hydrogen and carbon combine with it The greater the extent and capacity of the lungs, the more frequent is respiration; and the greater the warmth and vivacity of animals."

The whole blood of the body, say 24 lbs. passes through the lungs in three minutes, and it has been proven, by direct experiment, that at each revolution it acquires two degrees of heat; therefore, as the temperature of ice 32 and boiling water 212, it follows, that the difference of heat between ice and boiling water is 180 degrees, and as the whole blood in the body is heated two degrees every three minutes, were the heat not carried off by perspiration and otherwise, in the course of four and a-half hours all the blood in our body would be raised in heat from the temperature of ice to that of boiling water; and in the course of a life of seventy years, supposing three thousand two hundred and seventy rum puncheons, of a hundred gallons each, to be full of water in the state of solid ice, it would be all liquified and raised in temperature to that of *boiling water* by the heat generated in the human lungs;—aye, as much ice would be raised to the same heat as boiling water during a life of seventy years, as would laden one thousand six hundred and thirty-five carts, with two large puncheons as a draught for each horse. Such is a bird's-eye view of only one branch of the work performed in the human lungs.

I have subjoined at the end of this article, a cut to illustrate the beautiful system of the HEART—more properly hearts and blood-vessels, as man has, in fact, two hearts joined in one, viz. the HEART of the LUNGS which is the *right side* of the compound heart, and the HEART of the BODY, which is the *left side* of the compound heart; the heart of the lungs, which lies on the right side of the heart of the body, *(g)*, receives into its upper part, or auricle, *(b)*, —so named from its resemblance to a dog's ear—the great vein, *(a)* called the *vena cava*, from its immense size; and there is an ascending and descending *cava*, *a a*, the one bringing the blood from the lower and the other from the upper parts of the body, they meet at *b*, and form a part of the *auricle* by their dilation, into *it* they pour all the returning blood of the body; it is the first cavity of the heart; being filled with blood it contracts and drives the blood down into the ventricle, or lower cavity of the heart, which is the right ventricle; the blood then passes through *d*, the pulmonory arteries into the lungs, where it is exposed to the vitalizing influence of the atmospheric air, and becomes changed in colour and qualities—from being dark in colour, and cold and heavy, and *positively electrified*, it becomes red and spumous, and warm, and light, and negatively electrified. In a word, it has now had communicated to it the principle of life. The blood now passes out of the lungs by the pulmonary veins, *(e)*, and falls into *(f)*, the *left auricle*, or upper part of the *heart* of the body; it then passes into *g*, the left ventricle, and from that into the great artery or *aorta*, *(h)*, which conveys the blood through all the body by means of myriads of arteries.

Therefore, there are, strictly speaking, *two hearts*, two systems of blood-vessels, two kinds of blood, and two circulations—these two hearts might have been placed in opposite sides of the chest as well as the lungs, but as they were meant to be subservient to the lungs they have been placed in the middle, and are joined together so as mutually to strengthen and support each other, they thus united, are enclosed in a membranous capsule, or bag, called the *pericardium*, or *hool of the heart*.

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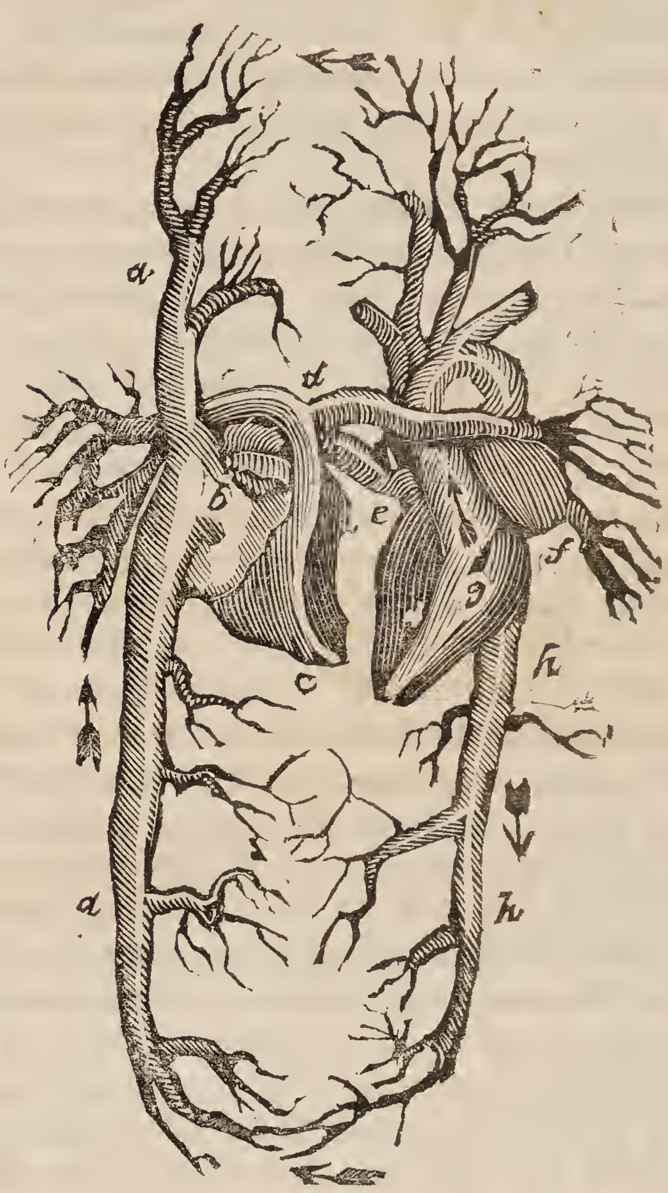
* MONRO'S *Elements of Anatomy*, vol. II. p. 93.

As our lungs, in a full inspiration, contain about 220 cubic inches of air, the whole internal surface of the lungs, will be nearly equal to 440 square feet, or nearly thirty times greater than that of the whole surface of the body.

CIRCULATION OF THE BLOOD.

The Arterial and Venous Circulation of the Blood.



a a, Ascending and descending cava, the great venous blood-vessel, *b,* the right auricle which receives the venous, and cold blood from the body; *c,* the right ventricle, which drives the blood through the vessels *d,* to the lungs, to be heated, &c.; *d,* the pulmonic artery, because the blood is driven through it to the lungs; *e,* pulmonary veins, that return the heated and otherwise enlivened blood into the left auricle; *f,* or upper ear-like portion of the heart; *g,* the left ventricle which receives the warmed and enlivened blood, from *f,* the left auricle, to send it through the body by the aorta, *h.*

1013. ANTIDOTE.

To opium or laudanum. The deleterious effects of opium, which are so often in the form of laudanum, may in great measure be conteracted by taking a proper quantity of lemon juice immediately afterwards. Four grains of opium, or a hundred drops of laudanum, are often sufficient for a fatal dose; but if an ounce of pure lemon juice, or twice that quantity of good vinegar be added to every grain of opium, or every twenty-five drops of laudanum, it will relieve both the head and the bowels; and the use of vegetable acids cannot be too strongly recommended to those who are under the necessity of taking considerable doses of opiates.

1013. ANTS.

Though it does not become us to be prodigal of life in any form, nor wantonly to seek its extinction, yet where any species of animals are found to be really noxious or annoying, the good of man requires that they should be destroyed. Houses are sometimes so infested with ants, that they are not to be endured. In this case, sprinkle the places they frequent with a strong decoction of walnut tree leaves; or take half a pound of sulphur, and a quarter of a pound of potash, and dissolve them together over the fire. Afterwards beat them to a powder, add some water to it; and when sprinkled, the ants will either die or leave the place. When they are found to traverse garden walls or hot houses, and to injure the fruit, several holes should be drilled in the ground with an iron crow, close to the side of the wall, and as deep as the soil will admit. The earth being stirred, the insects will begin to move about; the sides of the holes are then to be made smooth, so that the ants may fall in as soon as they approach, and they will be unable to climb upwards. Water being then poured on them, great numbers may easily be destroyed. The same end may be answered by strewing a mixture of quick lime and soot along such places as are much frequented by the ants; or by adding water to it, and pouring it at the roots of trees infested by them. To prevent their descending from a tree which they visit, it is only necessary to mark with a piece of common chalk a circle round its trunk, an inch or two broad, and about two feet from the ground. This experiment should be performed in dry weather, and the ring must be renewed: as soon as the ants arrive at it, not one of them will attempt to cross over. Ant hills are very injurious in dry pastures, not only by wasting the soil, but yielding a pernicious kind of grass, and impeding the operation of the scythe. The turf of the ant hill should be pared off, the core taken out, and scattered at a distance; and when the turf is laid down again, the place should be left lower than the ground around it, that when the wet settles into it, the ants may be prevented from returning to their haunt. The nests may more effectually be destroyed by putting quick lime into them, and pouring on some water; or by putting in some night soil, and closing it up.

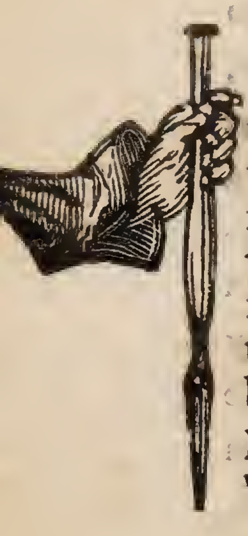
SOLUTION TO CONUNDRUMS.

1015. His Capital is doubling—(Dublin)—Answer to 987.

1016. It is *hardly* done—Answer to 988.

1017. On the Head—Answer to 989.

1018. Mistake—Answer to 990, 991, 992.



1019. THE POKER PUZZLE.—This feat is to be performed with a common fire poker, which you must hold near the top, between the fingers and the thumb. You must, then, by the mere motion of the fingers and the thumb, work the poker upwards, until the slender part be moved up to the hand, whilst the poker remains perpendicular during the whole process. For the first few times that this is attempted to be done, considerable difficulty will be experienced, as it not only requires strength in the fingers, proportionate to the weight of the poker, but also a certain knack, which is only to be acquired by practice.

1020. To take a Shilling out of a Handkerchief.—You must have a curtain ring, the size of a shilling. At first, you put the shilling into the handkerchief; but when you take it out to shew there is *no deception*, you slip the ring into its stead, and while the person is eagerly holding the handkerchief, and the company's eyes are fixed upon the form of the shilling, you seize the opportunity of secretly conveying it away. When you have possession of the handkerchief again, you slip away the ring.

1021. THE DANCING EGG.—Boil an egg hard, then after peeling off a piece of the shell at one end, thrust in a quill filled with quicksilver, and seal it at each end. As long as the egg remains warm, it will not cease dancing about.

1022. A man went into a shop, and borrowed as much money as he had in his hand; of which he spent a sixpence; he went into a second shop, and borrowed as much as he had remaining; of which he spent sixpence, and had nothing left. I demand how much money he had when he went into the first shop. It is expected that the readers of the Experimentalist will have solved the above before next publication.

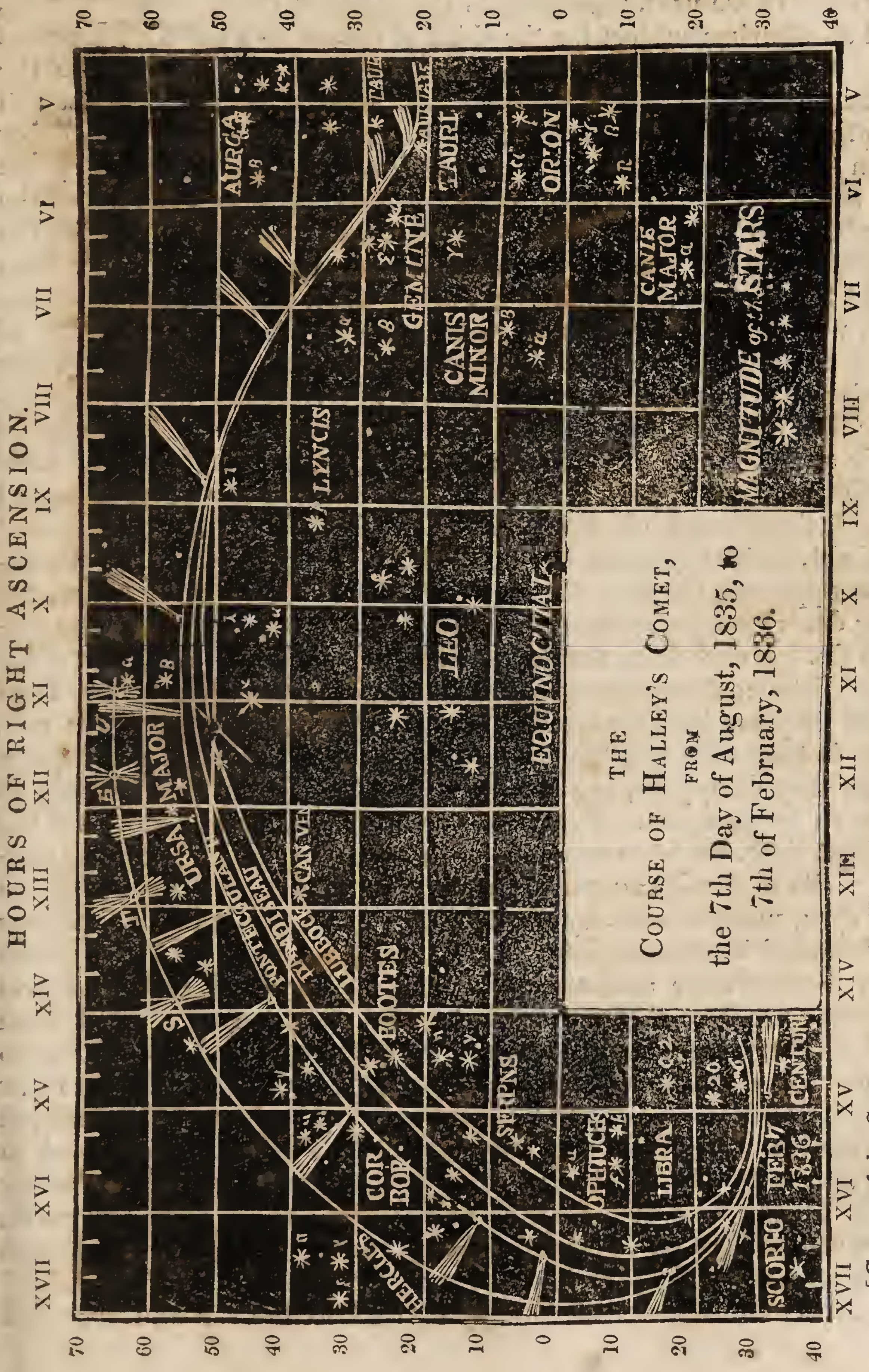
1023. A man has a wolf, a goat, and a basket of cabbages, to carry over a river; but, as he is obliged to transport them one by one, in what manner is he to accomplish his object, so that the wolf may not be left with the goat, nor the goat with the cabbages!

1024. How are four poles to be placed in the ground precisely at an equal distance from each other?

Stuart's Useful Information for the People, No. 45,

Being No. 29, of the

CHEMICAL EXPERIMENTALIST.



[Course of the Comet amongst the Fixed Stars, according to the Theories of M. Pontecaulant, M. Damoiseau, and Mr. Lubbock.—From the 'Nautical Almanac.']

1026. PHILOSOPHY OF NATURE.

The philosophy of nature is that subject of study whereby we become acquainted with those universal laws which regulate natural effects; it is that hypothesis by which universal natural phenomina may be traced to their cause; in short, it is the *natural theologist's revelation.* The philosophy of the uses of comets is a subject yet unexplored by the rational eye of the *free-thinking* intellectual enquirer. There uses, therefore. in the circle of the universe, is a fit, and an alluring subject for the child of nature to whet his judgment on. Comets have been said to be opake, and solid bodies like the planets, and like them perform their revolutions about the sun in elliptical orbits, which have the sun in one of their *foci.* They differ from the planets in this, that they move in various directions, some the same way with the planets, others the contrary; in short, of the number 136 whose orbits have been calculated, 69 move with the planets from left to right, while 68 move in a retrograde order from right to left, and the inclination of their orbit passes through all angles with the ecliptic from 0 to 90 degrees, while the longitude of their ascending nodes are distributed all round the ecliptic. Their motions are from these circumstances not confined within the zodiac like that of the planets; and so great is the eccentricity of their orbits, that some of them perform the greatest part of their motions almost in direct lines towards the sun, which having passed round, they march off again in nearly right lines, till they are out of sight, as if they were hastening back to the fixed stars. As comets approach the sun, the rapidity of their motion increases, for they describe equal areas in equal times about its centre, as the planets do. Hence it is, that when in their *perihelia,* (that is, at their least distance from the sun) their motion is immensely swifter than when they are in their *aphelia,* or greatest distance from the sun. This is the cause why they are visible to us for so *short* a time, and when they disappear, are so *long* before they come near enough to be seen by us again. From the remotest periods of history till the present time, we have evidence of these eratic bodies (comets) paying visits to the inhabitants of our earth, and becoming visible to our eyes, unaided even by the telescope, but the ludicrous notions entertained by philosophers and others of the uses for which these fiery bodies were and are upheld in their varied and eccentric courses, are any thing but what might have been expected from philosophers, and creatures whose every *thought* and *breath* was to themselves a testimony of an overuling *universal beneficence.* Pope Callixtus, when Halley's comet appeared in the year 1456, ordered a prayer in which both this comet and the Turks were included in one *anathema.* Others have supposed that they are merely parading space till the time they shall be required to *pounce* upon our earth, to envelope it in on universal conflagration. Bible commentators, (Whiston in particular) have supposed comets to be "HELLS" where the damned are alternately carried to the sun and scorched in a heat 2000 times hotter than red-hot iron, and are again whirled off into the extremes of the solar universe, where cold is 2000 times more intense at the opposite extreme. Kepler, the philosopher, supposed comets to be great *aerial* fishes, which swam in aether by means of *fins*; and that their immense tails was vapour which they sweated through terror at approaching our earth. *Newton* supposed that comets supplied the sun and planetary system with pure particles and fresh fuel, to supply their loss of air and moisture during the processes of vegetation. It is really strange to see how nearly fanaticism and religion will approach to the ridiculous, when endeavouring to solve the philosophy of nature. How natural it is for a POPE to suppose that every messenger of *nature* sent by his God to the confines of earth, should be a messenger of evil. *This* God cannot move his finger, but it is held to betoken some mischief about to be played on mankind. Another orthodox believer cannot find any use for the manifestations of universal beneficence beyond his own limited species, he therefore supposes these fiery orbs to be nothing else but meteors of Divine wrath suspended in the heavens for no other purpose but (at the end of a thousand years) to set this world on fire. Bible commentators, being at a loss to account for their uses, and at the same time being in want of a situation for their hell, solve both difficulties at once, by turning all the comets into "HELLS." Kepler is natural enough, with a vengeance—he turns them all into fishes; while Newton, with more rational sagacity, supposes them subservient to the necessities of the solar system. It is therefore from the conjectures of these great men, acknowledged that they are not *useless* objects in nature, but that they have uses to perform with respect to this earth or its inhabitants, either as destroying meteors, or hells for departed humanity. It therefore cannot be thought presumptuous in me, to give my views of the matter, as I have just as good a right to tender a supposition on the subject as any other man; and whither I shall be so fortunate as to hit the mark, I know not; but this I know—I shall be far from it, if I attain not nearer than any who have preceded me. I should think it is now universally acknowledged that there is nothing without its use in nature, moreover, that all the processes and movements in nature are the effects of its obedience to certain rules or laws, which, of course, leads us to a lawgiver; and where-ever there is *rule*, or *law*, there is order. Comets, therefore, must be orderly, useful bodies in nature, observing its universal laws of usefulness. It then becomes a question, What uses are they most likely to be subservient to in the solar system? in answer to which, I make no scruple to hazard the supposition that *comets* are MALE PLANETS, and that their tails are their generative organs. Some libidinous reader (may be apt to curl up his canting upper lip) at such an idea being recorded in the Chemical Experimentalist, but I will only ask him to suspend the expression of his contempt till he shall find himself able to refute the reasoning by which I shall support this new and rational doctrine of the uses of comets. My reasons for that supposition is because I find it agree by analogy with the *resl*—the whole of nature's works. In the animal, vegetable, and mineral kingdoms, does not all the varied departments of nature exist in the states of male and female. Is not each class of being, as an individual existence characterized by destinction of sex, and the united re-action of sex produces or eleminates the succession or continuity of existence; and what is so universally true in the particular, why not also in the universe in general? We have, therefore, male and female worlds, and instead of comets being messengers of destruction revolving within our system, I trust to be able to shew that they are only the primitive source of all sublunary generation and fruitfulness.

To be continued.

1027. ILLUSTRATION OF THE SOLAR SYSTEM, plate 7th, facing page 243.—In this plate of the solar system, the exact proportions of the several distances at which the planets revolve round the sun are strictly adhered to, a circumstance I am not aware has been attended to in any other plate of the same size. I have adopted this plan in preference to the common method, so that the reader may be enabled to form a more perfect conception of the respective distances of the planets, with respect to each other, from the sun, than can be grasped in idea when comparing them in the mind by the numeration of figures; but with respect to the satellites of Jupiter, Saturn, and Uranus, I have not been able to follow the same rule on account of the proximity of their orbits to each other, as owing to the smallness of the scale from which the system is laid down, it would have crowded their orbits so as to have appeared quite indistinct and unintelligible. This view of the solar system is intended to give an idea of what would be the appearance of our system were a spectator to be raised above the sun, in a line at right angles with our earth's orbit. In such a situation, he would see the sun in the centre, and all the planets revolving around him at their respective distances as seen in the plate, whilst the comets would appear advancing and retreating from the sun in all possible directions; those comets, whose orbits lay within the zodiac, the same as the planets, would be seen advancing from the extremities of the system towards the sun, just as seen in the plate, PP—22—n n—SS—o o–r r—while those whose orbit lies contrary to the plane of the ecliptic, in short, at right angles to the orbits of the planets, would be seen for a long time apparently almost in the same situation advancing towards us, and after turning round the sun, receding from us again. In short, Halley's Comet, which is now visible, would be seen retiring from us backward into remotest space, for for many years, almost in the same point of the system.

The planetary bodies in the solar system, so far as at present known, are eleven, which I will describe in the order as seen in the plate as proceeding from the sun in the centre, towards Uranus, M, at the circumference. The SUN, A, as seen in the centre of the system. It is an immense globe whose mean diameter is 883,246 miles. It revolves on its axis from east to west, once in 25 days, 14 hours, 8 minutes, which is ascertained by observing the motions of certain spots on its surface. Its axis deviates also about 8° from a perpendicular to the plane of the ecliptic. Dr. Herschell considers the sun to be a magnificent habitable globe, surrounded by a double set of clouds. The nearest planet to the sun is MERCURY; it is marked B in the solar mass, and that circle which passes through its centre, and makes a circle round the sun is its ORBIT. It is 3224 miles in diameter, and revolves round the sun in its orbit in 87 days, 23 hours, 14 minutes, 33 seconds, at the distance of 37,000,000 of miles from the sun, and with a velocity of 109,000 miles in one hour. The heat of the sun at its surface is calculated to be 7 times greater than at our earth. Mercury's orbit is inclined to the plane of the ecliptic about 7° and the sun appears at his surface three times as large as he does to us. VENUS, is in the second circle round the sun, and is marked C, in the map. She is the most beautiful star in the heavens, and has been emphatically called by distinction the morning and evening star. She revolves in her orbit (that circle in the map which passes through her centre, and around the sun), in 224 days, 16 hours, 41 minutes, 27 seconds, at the distance of 61,000,000 of miles, and revolves round her *own axis* in 23 hours, 22 minutes, which is the length of her day. Her diameter is 7687 miles, and her orbit is inclined to the ecliptic about 3° 23′ 35″. To the inhabitants of Venus the sun appears twice as large as to us; and (mark this) her atmosphere has been calculated as being 50 miles in height, *from a shade appearing on the sun's surface before the dark body of Venus seems to touch his edge at the time of her transit* (her passage across the sun's face). She has no satellite, and her own axis is inclined 75° from the axis of her own orbit. She travells in her orbit at the rate of 80,295 miles an hour, and round her axis at the rate of 1943 miles in the same time. The next circle round the sun is the ORBIT OF OUR EARTH. It is marked D where our earth is situated in it, and is attended by her *one* satellite, the moon, whose orbit you will again see encircling our earth. The earth's distance from the sun is 95,173,000 miles; and she passes round the circle of her orbit in about 365 days, 6 hours, 9 minutes, and 12 seconds, which constitutes her year Her axis is not perpendicular to the plane of the ecliptic, bnt is inclined to it at an angle of 23° 28″ and around this her own axis she revolves in 23 hours, 56 minutes, 4 seconds, 09, being the siderial or astronomical day; and this inclination of 23° 28″ of the earth's axis to the plane of the ecliptic is the principal cause of the change of season, which is beautifully illustrated by the cut, page 241, on the title of part sixth. The motion of the earth is 68000 miles per hour round the sun in her orbit, it is called her annual revolution or motion, and is performed in 365 days, 5 hours, 48 minutes, 49 seconds, and is called her tropical year, while her rotation on her own axis (at the equator, 1030 miles, and at the latitude of

London 580 miles per hour) is performed in 24 hours, being the solar day of *mean* solar time, and is called her diurnal motion. Our earth is surrounded by a compound atmosphere which is supposed to be about 45 miles high. (For its constitution and experiments thereon, see articles 165, 166, 168, 171, 179, 180; 181-2). The MOON—*our moon*—the *maiden moon*—is our earth's satellite. She revolves round our earth in an elliptical orbit with the earth in one of her *foci* in 29 days, 17 hours, 44 minutes, 3 seconds; and at the same time she revolves round the sun in company with our earth; (of course) in one year, her diameter is 2180 miles, and her distance from us 240,000. Her rotation on her axis, is performed in the same time as her revolution round our earth; hence she keeps the same side continually towards us. With good telescopes the surface of the moon has been seen diversified with hill and dale—mountains and volcanoes.

The next planet in the map is MARS, an *impregnated planet.* It is seen in its orbit outside of our earth marked E. We have also a telescopic view of its surface, (same plate) marked V. This planet is 144,000,000 of miles distant from the sun, and makes its annual revolution in 687 days, and rotates round its axis in 24 hours, 39 minutes, 22 seconds, having his axis inclined to his orbit, 59° 22 his mean diameter is 4189 miles. This planet is of a dusky red colour, and when he is opposite to the sun, and on our meridian at midnight, he is much more brilliant than in any other situation, being then *five* times nearer us than at a conjunction. This planet has a great and dense atmosphere, which is so remarkable that it *changes the colour* of the fixed stars, and renders them dim, nay, almost invisible, though at some little distance from the planet as she approaches them. In referring to the telescopic view ef Mars, V, there will be seen a bright polar spot at its upper edge. This has been supposed to be a vivid reflection of light from snow about its polar regions, as it is observed to increase and decrease in magnitude, as it is absent or exposed to the rays of the sun.

VESTA (a maiden planet) is the next planet in the system, and will be seen in its orbit, marked F. It was discovered by Dr. Olbers of Bremen on the 29th March, 1807. Its distance from the sun is about 215,000,000 of miles, and its annual revolution is 1335 days. Its orbit is inclined to the ecliptic 7° When the sky is clear, it may be discovered with the naked eye.

JUNO, another maiden planet, (marked G) is the next in its orbit. It was discovered by Harding of Likenthal, on September the first, 1804. Its distance from the sun is 243,000,000 of miles, and its annual revolution 1590 days, and the inclination of its orbit to the ecliptic is 14°.

CERES, an *impregnated planet,* (marked H) is the next in order, and was discovered by Piazzi, an Italian astronomer, on the first day of January, 1801. Its diameter is 1024 miles, and its distance from the sun is nearly 263,000,000 of miles; its annual siderial revolution is performed round the sun, according to Laplace in 1681 days, 17 hours, 57 seconds; and its orbit is inclined to the ecliptic about 11° 48″. Its atmosphere is supposed to be about 675 miles high, (see article 895, page 200)—PALLAS, an *impregnated planet,* (marked i) is the next in order. It was discovered on the 28th March, 1802, by Dr. Olbers of Bremen. It is nearly 264,000,000 miles from the sun, its diameter is 2090 miles, its orbit is inclined to the ecliptic at the extraordinary angle of 38°, and its immense atmosphere extends in height to 468 miles. These two last planets have been named *asteriods* from the circumstance of their great deviation from the *zodiac,* also from their extended atmospheres placing them between *planets* and *comets.* For further particulars respecting these, far newly discovered planets, see article 895.

JUPITER—-IMMENSE JUPITER——is an *impregnated planet,* (marked K), it is seen in its orbit in the map with its four attendant MOONS revolving around it in their *orbits.* A telescopic view of it is seen, with its belts, on the right hand at the bottom of the plate U. This large planet revolves on its axis in the short space of 9 hours, 55 minutes, 37 seconds; his year is 4330 days, 14 hours, 39 minutes, 2 seconds, and his distance from the sun is 490,000,000 of miles. His diameter is 89,170 miles, and he is the brightest of all the planets except Venus. Jupiter, as I said before, has four moons or satellites, and three of these are eclipsed at every revolution. By these eclipses has been discovered the velocity of light; also, by them is discovered, with great precision, the difference of longitude of places on our earth; for instance, our earth makes one revolution on its axis in 24 hours, and as 360° is the circumference of the circle on its surface, it consequently describes 15° in one hour; and as two different individuals in different situations east and west from each other may observe the eclipse at the same instant, it follows, that if each spectator note the time at which he witnessed the eclipse, the difference of their respective times may be converted into their difference of longitude *east* or *west* from each other, by converting their difference in hours, minutes, and seconds, into degrees and fractions thereof, which would be the difference of their longitude, or the difference that either spectator was east or west from the other. To make it still clearer;—allowing one spectator to be exactly 15° eastward of another, it is evident the sun would be on his meridian exactly *one hour* sooner than with his neighbour who was 15° distance to westward. Therefore, allowing it to be 12 o'clock at midnight with the eastermost spectator when he observed the eclipse, it would be only 11 o'clock with the westermost, although they both observed the eclipse at the same instant, and their difference in meridian time will be their difference in longitude.

SATURN, an *impregnated planet,* (marked L) is the next in order to Jupiter from the sun, and also in magnitude. It requires 10,746 days, 19 hours, 16 minutes, 15 seconds in revolving only once round the sun. Its day is about 10 hours, 16 minutes, and 16 seconds; his orbit is inclined to the ecliptic 2½ degrees; and the inclination of his axis to his orbit is 60°. This planet, when viewed through a good telescope, has the appearance (shewn at T) something like Jupiter with *belts*; but he has in addition a broad luminous ring, or double ring. It is surrounded by *sevenmoons* or satellites. For further particulars see 671.

URANUS, or HERSCHEL, an *impregnated planet*, is the farthest distant *knownplanet* of the solar system. It is marked M, and has six attendant moons. For farther particnlars see 670.

COMETS are the next class of bodies that belong to the solar system. More than 500 of them are supposed to have appeared since the christian era, but I have contented myself with delineating the orbits only of *six* of them. The first we shall direct our attention to, is marked R in the margin, and its orbit will also be seen in the system marked r r. Its period is 575½ years; it appeared in the year 1680, and will again appear in the year 2256. It was this comet, it is supposed, which caused Noah's flood. (See 935). The comet O, as seen in the margin, is much about the appearance of the comet visible now, (for its former appearances see 885), but it is expected its tail will become much more brilliant after it passes its perihelion. Its orbit is seen o, o, in the system; its period is 75½ years. The comet S, as seen in the margin, is the appearance of one which appeared in the year 1590, within 40,000,000 miles of the sun, a part of its orbit is marked s, s, its period is not known. The comet marked N in the margin, and its orbit n, n, in the plate, was seen in the year 1337, within 33 millions of miles from the sun's centre; its period is not known. The comet Q appeared in the year 1811, its orbit is marked g, g, its nucleus was 2067 miles in diameter, and its tail was 23° in length. The comet marked P, appeared in the year 1661, and again in 1789, and will appear again in the year 1918; its period is 129 years. (For further particulars respecting Halley's comet and others, see articles 668, 669, 672, 673, 674, 676, 885, 892, 893, 895, 935. In the engraving at the commencement of this number 1025, is seen the path which was laid out for this comet by the calculations of Lubbock, Damoiseau, and Pontecaulet, but it is found that it has taken a path for itself a good deal higher; in short, I have given a part of its orbit where it was seen by myself at four different times; in truth, I essayed, like others, to delineate a path for this stranger, but like my neighbours, I found when I got a glimpse of *his most gracious presence*, (recollect I mean to prove that comets are MALE PLANETS), that I was altogether out in my reckoning. I therefore resolved to adopt an easier method, and a surer, viz. to mark down his path as I should see him progress in it.

1028. A SIMPLE METHOD BY WHICH ASTRONOMERS INVESTIGATE THE APPARENT COURSE OF A COMET.—They observe what two stars are directly one on one side of the comet, and the other on the other side, which is done as follows: Hold up a thread between the eye and the two stars, and extend it in such a manner as that it shall seem to cross each star; then look out two other stars between which the comet shall appear in a line as before; then extend a thread in the same manner from the same stars upon the celestial globe, and the point on the globe where the threads cross each other is the true apparent place of the comet's situation at the time of the observation. This they do daily, and so trace out its apparent place in the heavens.

1029. **THE SIDERIAL DAY.**—The siderial day is of the exact duration of 23_h $56'$ $4''$ 09. This is the time which a star takes from leaving our zenith, till it arrives at it again, and is called the siderial day.

1030. **THE LUNAR DAY.**—The Lunar day is of the average duration of 24^h 54^m of ordinary time, which is solar time, being 24_h to the day of mean solar time.

1031. An Excellent way to ascertain the going of a Watch or Clock, *also to ascertain the exact length of a sederial, lunar, and solar day, without almost any apparatus at all.*—Merely let the observer stand upon the north side of some perpendicular object, say a wall, or the angle of a building, and place his eye to a certain fixed point (such as a small hole in a piece of tin plate nailed to some support, and notice the disappearance of some star behind a building by a watch, when ascertaining the sederial day; the moon when ascertaining the lunar day; and the sun when regulating the watch for the solar day. It is necessary, when observing the sun, to protect the eye by means of a piece of dark coloured or smoked glass; also pay attention when observing the stars, that you do not fix upon a planet.

Note. It is further advisable too, in observing either the sun or moon, to note down the moments when their western and eastern edges come to the edge of the wall when half the interval will give the exact moment of the disappearance of its centre.

1032. Difference of the weights of bodies at the Equator, and the Poles, *whereby a weight of* 194 *cwt. at the equator, would weigh, if weighed with a spiral spring,* 195 *cwt. at the poles.*—It is a fact now indisputable, that the above is strictly the case. It becomes then our duty to enquire what is the cause of this increase of weight? It is then what is called gravity, or a difference in gravity, or the downward tendency of bodies toward the earth's centre, which gradually encreases from the equator to the poles; the consequence of which will be, all persons purchasing goods, and weighing them by a *spiral spring,* willl find them get lighter as they carry them south; and all persons purchasing a certain weight of goods, (say cheese) and carrying them north, say from Glasgow to Aberdeen) will find them get heavier.

Stuart's Useful Information for the People, No. 46,

Being No. 5 of the

PANORAMIC DICTIONARY.

1033. AQUAFORTIS.

(See 155 Experimentalist, page 30).

1034. ART OF BLEACHING ILLUSTRATED.

(See 119 Experimentalist, page 30).

1035. ASTHMA.

(To breathe with difficulty). Difficult respiration, with a sense of tightness across the breast, a wheezing, hard cough, at first, but more free towards the close of each fit, with a discharge of mucus, followed by a remission.

Asthma rarely appears before the age of puberty, and attacks men more frequently than women, particularly those of a full habit, in whom it never fails, by frequent repetition, to occasion emaciation, In some instances, it arises from hereditary predisposition, and in others, it seems to depend upon a particular constitution of the lungs. Its attacks are most frequent during the heats of summer, and in general commence about midnight. On the evening preceding an attack of asthma, the spirits are often much affected, and the person experiences a sense of fulness about the stomach, with lassitude, drowsiness, and a pain in the head. On the approach of the succeeding evening, he perceives a sense of tightness across the breast, and a sense of straitness in the lungs, impeding respiration. The difficulty of breathing (both inspiration and expiration) is performed slowly, and with a wheezing noise; the speech becomes difficult and a propensity to coughing succeeds, while the patient can no longer remain in a horizontal position, being as it were threatened with immediate suffocation. These symptoms usually continue till towards the approach of morning, when the breathing becomes less laborious and more full, and the person speaks and coughs with greater ease. If the cough is attended with an expectoration of mucus. he experiences much relief, and soon falls asleep. The pulse is not necessarily affected in this disease, though often quickened by the difficulty of breathing; and sometimes slight fever attends. In plethoric habits, the countenance is flushed and turgid during the fit; but in others pale and shrunk: in the former some difficulty of breathing and wheezing usually remains in the interval between the fits; in others, the recovery is more complete. On this is founded the common distinction of asthma into the humid or catarrhal, and the dry, spasmodic, or nervous forms. The exciting causes are various;—accumulation of blood, or viscid mucus in the lungs, the repulsion of eruptions, flatulence, accumulated fæces, organic disease in the thoracic viscera, &c. They vary according to the form of the disease. In young persons of a plethoric habit, a flushed countenance, accelerated pulse, &c. The abstraction of blood will be found to afford marked relief; but under opposite circumstances, it would prove highly injurious, and we should always avoid repeating it unnecessarily. Mild cathartics should also be employed; or, when costiveness appears to induce the fits, those of a more active nature. A cup of strong coffee has often afforded speedy relief. Means should be employed for strenghening the system; and where there appears a tendency to serous effusion, digitalis may be very useful. But by far the most important part of the treatment consists in obviating or removing the several exciting causes, whether operating on the lungs immediately, or through the medium of the stomach, bowels, &c. Individual experience can alone ascertain what state of the atmosphere as to temperature, dryness, purity, &c., shall be most beneficial to asthmatics, though a good deal depends on habit in this respect.

1036. ATHEIST—ATHEISM.

Formerly he who was possessed of any secret in an art, ran great risk of being looked upon as a sorcerer. Every new sect was accused of murdering infants in the celebration of its mysteries; and every philosopher, who departed from the jargon of the schools, fanatics and cheats never failed to be charged with atheism; and ignorant and weak judges as surely passed sentence on them.

Anaxagoras took upon him to affirm, that the sun is not guided by Apollo, sitting in a car drawn by four mettlesome steeds; on this he is exclaimed against as an atheist, and obliged to fiy his country.

Aristotle, being accused of atheism by a priest, and not being able to procure justice against his accuser, withdraws to Chalcis. But, in all the history of Greece, there is not a more heinous transaction than the death of Socrates.

Aristophanes (whom commentators admire because he was a Greek, not considering that Socrates was also a Greek,) was the first who brought the Athenians to account Socrates an atheist.

This comic poet, who is neither *comic* nor a *poet*, would not have been allowed, among us, to have exhibited farces at St. Lawrence's fair. To me, he seems more contemptible, more low-lived, and scurrilous than Plutarch makes him, who speaks of him in this manner: “Aristophane's language is, indeed, that of a wretched quack, full of the lowest and most disagreeable points and quirks; he cannot raise a laugh among the very vulgar, and, to persons of judgment and honour, he is quite insupportable; his arrogance is beyond all bearing, and all good people detest his malignity.”

So this by the bye, is the buffoon whom Madame Dacier, amidst all her admiration of Socrates, can find in her heart to admire. This is the man who remotely prepared the poison by which infamous judges put an end to the existence of the most virtuous man then living in Greece.

The tanners, the shoemakers, and sempstresses of Athens were hugely diverted with a farce, where Socrates, being hauled up into the air in a basket. proclaims that there is no God; and makes his boast, that he had stolen a cloak while he was teaching philosophy. Such a people, and whose bad government could countenance such scandalous licentiousness, well deserved what has happened to them, to be brought under subjection to the Romans, and to be, at present, slaves to the Turks.

We shall pass over the common space of time between the Roman commonwealth and our days, observing only, that the Romans, who were much wiser than the Greeks, never molested any philosopher for his opinion. It was not so among the barbarous nations who seated themselves in the Roman empire. The emperor Frederick II., having some difference with the popes, was immediately arraigned of atheism, and reported to have been anathematized, jointly with his chancellor de Vincis, the author of the book, entitled, "THE THREE IMPOSTERS."

Our Chancellor de L'Hôpital, that excellent man was branded as an atheist, because he opposed persecutions—*Homo doctus sed verus atheos:* "a learned man, but a real atheist." A Jesuit, Garrasse, as much below Aristophanes, as the latter was below Homer, a wretch, whose name is become ridiculous among the very fanatics, makes every body atheists, at least this is the appellation he gives to all those who have incurred his displeasure. With him, Theodore de Bezza is an atheist; and he it is who led people into an error concerning Vanini.

Vanini's wretched end raises no indignation or pity, like that of Socrates. This Italian was only an insignificant pedant; yet was he no atheist, for which he suffered, but as far from it as man could be.

He was a poor Neapolitan churchman, a kind of preacher and professor of divinity, a vehement disputer in quiddities and universals; "*et utrum chimera bombinans in vacua possit comedere secundas intentiones.*" There was nothing in him which looked towards atheism: and his ideas of God are perfectly agreeable to the most sound and approved theology. "God is his beginning and end, the father of both, in no need of either; eternal without existing in time; every-where present, without being in any place. To him, there is neither past nor future, space nor time; the Creator and Governor of all things; immutable, infinite without parts; his power is his will," &c.

Vanini was for reviving the fine thought of Plato, espoused by Averroes, that God had created a chain of beings from the most minute to the largest, and the last link of which is fastened to his eternal throne; a notion which, though it has more of sublimity than truth in it, is as far from atheism, as something is from nothing.

He travelled to dispute and make his fortune, but unluckily, disputing is the very opposite road to fortune, every person against whom one enters the list, being thus made a rancorous and irreconcilable enemy. Hence Vanini's misfortunes; his heat and rudeness in disputing brought on him the hatred of some divines; and, having a quarrel with one Francon, or Franconi, this man being connected with his enemies, charged him with being an atheist, and teaching atheism.

This Francon, or Franconi, supported by some witnesses, had the barbarity, when confronted with Vanini, to maintain, with aggravations, the whole of what he had advanced; whereas Vanini, being interrogated as to what he thought of the existence of God, made answer, that, agreeably to the church, he worshipped one God in three persons, and, taking up a straw, which lay on the ground, "This," says he, "sufficiently proves that there is a Creator;" then made a very fine speech on vegetation and motion, and the necessity of a Supreme Being, without whom there is neither motion nor vegetation.

The president, Gramont, gives us an account of this speech, in his History of France, now scarcely known; and this historian, from an inconceivable prepossession, will have it, that Vanini spoke only out of "vanity or fear, and not from a sincere persuasion."

What grounds could the president, Gramont, have for such a rash and sanguinary judgment? It is manifest, that, on Vanini's answer, he ought to have been cleared of the charge of atheism. But what was the issue? This unhappy foreign priest dabbled likewise in physic; a large living toad, which he kept in a vessel of water, being found in his house, was made use of to charge him with sorcery, and the toad was said to be the only deity he worshipped. Several passages of his books were wrested to an impious meaning, than which, nothing is more easy and more common; taking the objections for answers, putting a malicious construction on every ambiguous phrase, and misrepresenting innocent expressions. At length his enemies extorted from the judges a capital sentence against him.

This death could not be justified, without accusing this unfortunate creature of most horrid crimes; and one Mersenne, a Minim, a name quite suitable to his character, has been so mad as to affirm in print, that Vanini set out from Naples with twelve of his apostles, to go and convert all nations to atheism. What incongruity! How could a poor priest have twelve men in his pay! How could he have prevailed with twelve Neapolitans, to undertake an expensive journey, and at the hazard of their lives, for the sake of disseminating this abominable doctrine? How could a king hire twelve preachers of atheism? This is such an absurdity as never came into one's mind, but Father Mersenne's. But from him the tale has been repeated over and over; the journals and historical dictionaries have been stained and sullied with it; and the public, *who are fond of extraordinary things*, have greedily swallowed it.

Bayle himself, in his Miscellaneous Thoughts, speaks of Vanini as an atheist, making use of him in support of his paradox, "that a society of atheists can subsist." He affirms that Vanini was a man of very regular morals, and died a martyr to his philosophical opinions. Now, in both he is mistaken. Vanini, though a priest, in his Dialogue written in imitation of Erasmus, does not hide from us that he had a mistress named Isabella. He was both a free liver and a free writer ; but he was no atheist.

A century after his death, the learned La Croze, and another under the name of Philalethes, wrote a vindication of him ; but the memory of a poor Neapolitan being what few gave themselves any concern about, these ingenious persons might have saved themselves that trouble.

The Jesuit Hardouin, with all Garasse's rashness, but much more learning, in his *Athei Delecti*, accuses the Descartes, the Arnaulds, the Paschals, the Nicholas, the Melbranches, of atheism ; but it was their good fortune to come to a better end than poor Vanini.

From all these facts, I now proceed to Bayle's moral question, "Whether a society of atheists could subsist?" And here let us previously observe the enormous contradiction of men in disputes ; they who most furiously inveighed against Bayle's opinion ; they, who have, with the greatest rancour, denied the possibility of a society of atheists, have since as confidently maintained, that atheism is the established religion in China !

They are certainly very little acquainted with China ; for had they only read an edict of the emperors of that vast country, they would have seen that those edicts are like sermons, frequently making mention of the Supreme Being, as governing, punishing, and rewarding.

At the same time, they are not less mistaken concerning the impossibility of a society of atheists ; and I wonder how Mr. Bayle came to overlook a striking example, which would have given a decisive victory to his cause.

Why is a society of atheists thought impossible ? because it is thought that men, under no restraint, could never live together ; that laws avail nothing against secret crimes ; and that there must be a wisely-avenging God, punishing, in this world or in the next, those delinquents who escape human justice.

Though Moses's law did not reach a life to come, it did not threaten any punishments after death, and did not give the primitive Jews the least insight into the mortality of the soul ; so far from being atheists, so far from denying a divine vengeance against wickedness, were the most religious men upon the face of the earth. They not only believed the existence of an eternal God, but they believed him to be ever present among them ; they dreaded being punished in themselves, in their wives, in their children, in their posterity, to their fourth generation ; and this was a very powerful restraint.

But, among the Gentiles, several sects had no curb ; the Sceptics doubted of every thing ; the Academics suspended their judgement concerning every thing; the Epicureans held, that the Deity could not concern himself about human affairs, and, in reality, they did not allow of any deity; they were persuaded that the soul is not a substance, but a faculty born and perishing with the body; consequently, their only check was morality and honour. The Roman senators and knights were downright atheists; as neither to fear nor expect anything from the gods, amounts to a denial of their existence: so that the Roman senate, in Cæsar and Cicero's time, was, in fact, an assembly of atheists.

That great orator, in his speech for Cluentius, boldly argues in a full senate,—"What hurt can death do to him? All the idle tales about hell, none of us give the least credit to: then what can death deprive him of? Nothing but the feeling of pain.

Does not Cæsar, Cataline's friend, in order to save that wretch from an endictment, brought against him by the same Cicero, object, that putting a criminal to death is not punishing him; that death is nothing; that it is only the end of our suffering; that it is rather a happy, than a fatal moment. And did not Cicero and the whole senate yield to these arguments? So that the conquerors and legislators of the known universe, were evidently a society of men without any fear of God; and thus were real atheists.

Bayle afterwards examines, whether idolatry be more dangerous than atheism; whether the disbelief of a Deity be more criminal than the having unworthy opinions of him; and herein he is of Plutarch's mind, thinking a disbelief preferable to an ill opinion. But, with submission to Plutarch, nothing can be more evident than that it was infinitely better for the Greeks to stand in awe of Ceres, Neptune, and Jupiter, than to be under no manner of restraint. The sacredness of oaths is manifest and necessary; and they, who hold that perjury will be punished, are certainly more to be trusted than they who think that a false oath will be attended with no ill consequence. It is beyond question, that, in a civilized state, even a bad religion is better than none at all.

Bayle therefore, should have examined, which is the more dangerous, fanaticism or atheism? Now, fanaticism is certainly a thousand times more mischievous; for atheism stimulates to none of those sanguinary procedures, for which fanaticism is notorious. If atheism do not suppress crimes, fanaticism incites to the commission of them. Allowing the author of *Commentarium Rerum Gallicarum*, that the Chancellor de l'Hôpital was an atheist, still the laws he made are wise and good, and all his counsels tended to moderation and concord. The fanatics committed the massacre of St. Bartholomew, Hobbes was accounted an atheist, yet he led a quiet, harmless life, whilst the fanatics were deluging England, Scotland, and Ireland, with blood. Spinosa was not only an atheist, but taught atheism; yet who can say he had any hand in the juridicial murder of Barneweldt? It was not he who tore the two De Witts to pieces, and broiled and ate their flesh.

Atheists, for the most part, are men of study, but bold and erroneous in their reasonings; and, not comprehending the creation, the origin of evil, and other difficulties, have recourse to the hypothesis of the eternity of things, and of necessity.

The sensualist and the ambitious have little time for speculation, or to embrace a bad system: to compare Lucretius with Socrates, is quite out of their way. Such is the present state of things among us.

It was otherwise with the senate of Rome, which almost totally consisted of atheists, both in theory and in practice, believing neither in Providence nor a future state. It was a meeting of philosophers, of votaries to pleasure and ambition; all very dangerous sets of men, and who, accordingly, overturned the republic.

I would not willingly lie at the mercy of an atheistical prince, who might think it his interest to have me pounded in a mortar; for, I am very certain, that would be my fate. And, were I a sovereign, I would not have about me any atheistical courtiers, whose interest it might be to poison me, as then I must every day be taking alexipharmics; so necessary it is, both for princes and people, that their minds be thoroughly imbibed with an idea of a Supreme Being, the Creator, Avenger, and Rewarder.

There are atheistical nations, says Boyle, in his *Thoughts on Comets.* The Caffres, the Hottentots, the Topinamboux, and many other petty nations, have no God: that may be; but it does not imply that they deny the existence of a Deity; they neither deny nor affirm; they have never heard a word about him. Tell them that their is a God, they will readily believe it; tell them that every thing is the work of nature, and they will as cordially believe that. You may as well say that they are Anticartesians, as to call them atheists. They are mere children, and a child is neither atheist nor theist—he is nothing.

What are the inferences from all this? that atheism is a most pernicious monster in sovereign princes, and likewise in statesmen, however harmless their lives be, because, from their cabinet, they can make their way to the former; that, if it be not so mischievous as fanaticism, it is almost ever destructive of virtue. I congratulate the present age on there being fewer atheists now than ever, philosophers having discovered, that there is no vegetable without a germ, no germ without design, &c. and that corn is not produced by putrefaction.

Some unphilosophical geometrians have rejected final causes, but they are admitted by all real philosophers, and, to use the expression of a known author, "A catechist makes God known to his children, and Newton demonstrates him to the learned."

1037. ATMOSPHERIC AIR

Diminished in bulk by respiration.

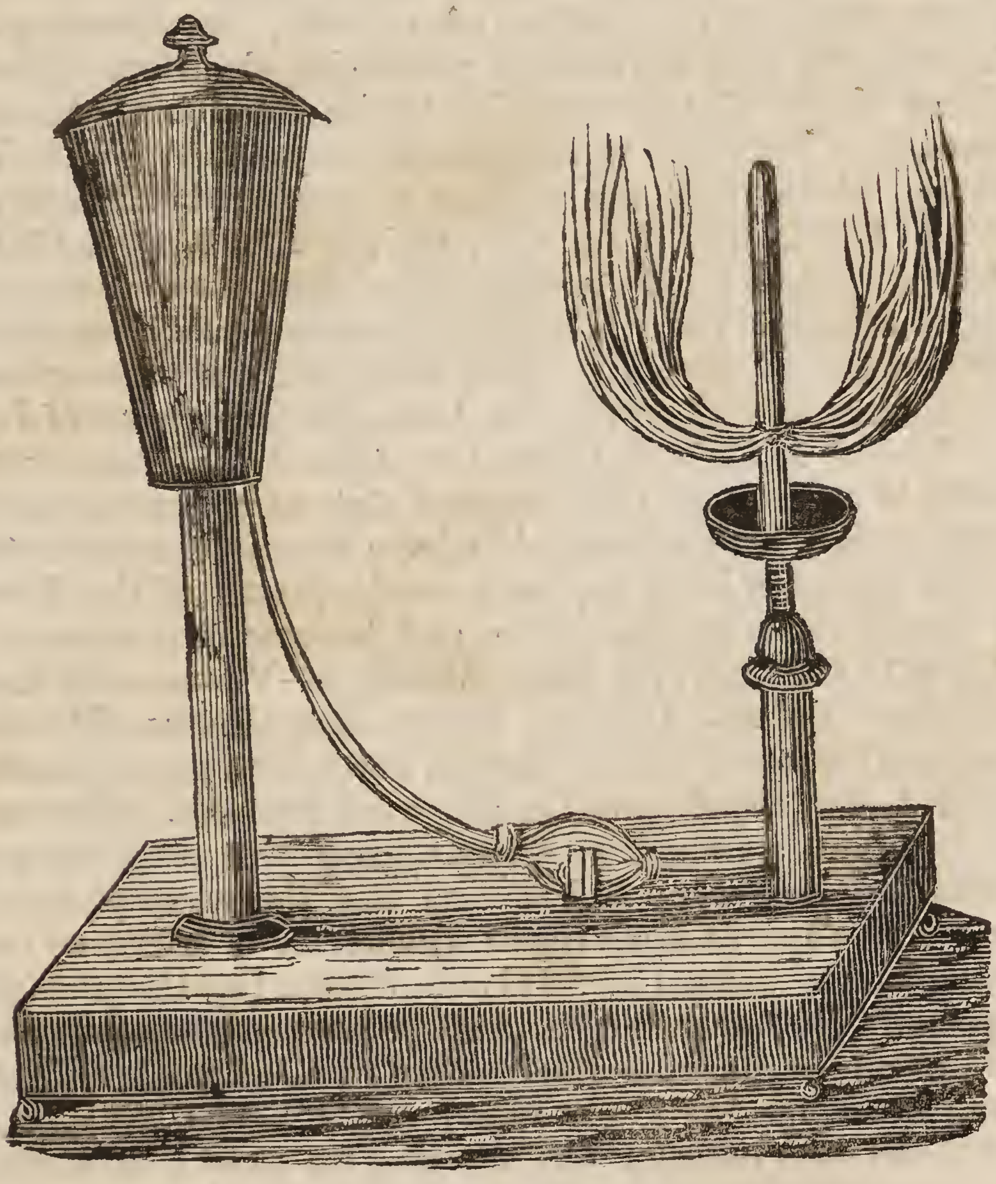
(See 162 Experimentalist, page 32.)

Stuart's Useful Information for the People, No. 47,

Being No. 30, of the

CHEMICAL EXPERIMENTALIST.

1038. A NEW AND IMPROVED (SELF-PREPARING) PORTABLE OIL-GAS LAMP, (see description, article 1040).



1039. PHILOSOPHY OF NATURE, *(continued from article* 1026, *page* 260).— In progressing onwards in my theory of the Philosophy of Nature, the course of my reasoning may appear to some as elliptical, and as *eratic* in its eccentric course, as that of those glorious bodies I am attempting to throw some light on the *uses* of, in the economy of the universe. But there is nevertheless not the smallest grounds for the supposition that my views of the science of life in general are not *orthodox* with respect to the system of nature, although quite *heterodox* to the prevailing opinions of the *age* I live in. All the difference that exists between *my orthodoxy* and the heterodoxy of the age, or if you will rather have it *thus,* of my heterodoxy to the opinions of the schools; but *orthodoxy* with respect to the universal laws of nature, consists in my reasoning being the *Cometary blaze* of the masculine or male influence of the *male intellectual electricity,* while my opposing partners are guided by the female influence of the same; the consequence is, that their *female* philosophy of nature only requires to be impregnated by my *male,* life-inspiring philosophy, and then shall the intellectual philosophical world have become pregnant, and in due time will bring forth fruit—a glorious system of mental, moral, physical, and universal philosophy. It, on these grounds, becomes my business to impregnate, so far as my abilities are capable, the *female philosophy of the schools,* with my *male* or generating electrical philosophy. In applying this species of reasoning to the solution of the uses of the *cometary,* in reference to the *planetary* system. I would, as a preliminary, recommend my readers to peruse the articles, 668, 669, 670, 671, 672, 673, 674, 676, 685, 892, 893, 895, 896, 935, 1025, 1027. It will thence be ascertained that many of the planets are without atmospheres, while others are abundantly supplied with them of immense dimensions. For those without atmospheres, I refer the reader to the Moon, Vesta, Juno, the *four* moons of *Jupiter, seven* of *Saturn,* and *six* of Uranus or *Herschell.* These may all be considered to exist in their *maiden state* of unimpregnation, till such time as they are ascertained to have atmospheres surrounding them. On the other hand we have ample proofs of the following having passed their maiden state, and become impregnated; viz. our CENTRAL STAR, *the Sun*—Mercury—Venus—the Earth—Mars—Ceres—Pallas—Jupiter—Saturn, and Uranus. My reasons for arranging the above in two classes, viz. into unimpregnated, and impregnated, are based upon the following grounds. The individual planets of one class are without atmospheres, while those of the other have atmospheres; and we find that the atmosphere of our earth is the true source of all life in it, whether in reference to vegetable, chemical, or animal life. It is therefore a fact that the impregnative principle in our atmosphere is the true source of all life with reference to our earth. This brings me to what has been (according to the orthodoxy of the schools) called "The Creation," but which I must for a little forbear referring to, until I have advanced a little way in illucidating the process of planetary impregnation. As I have before stated, it has been acknowledged by all men of science, and all the processes of change in nature verify the universality of the truth, that a motion of electricity accompanies every change in the constitution of things; therefore what is true in the *general,* and even when we descend to the *particular*—why not also in the *universal?* Comets, according to my hypothesis, are male planets—immense bodies charged with positive, or the universal generative electricity. Their *tails* are emanations by which their generating influence is shed over the universe; in short, a comet's tail is a stream of electricity diffused by a male meteor to some female world within the range of its influence. There can be but little doubt were any planet or moon to come within, or pass through the *tail* of a comet, but that it would be enveloped in a portion of that comet's tail, which envelope would, on the comet's leaving the planet, become spread over its surface as an atmosphere. Thus it is easy to understand why some planets are destitute of atmospheres, while others have them immensely *dense* (for instance Mars) and *large* (for instance *Ceres*) for the magnitude and density of the atmosphere of any planet, by one *cometary* impregnation will just be in proportion to their respective weights, bulks, and electrical activity, as also their near approximation. For instance, if a planet were to pass through the extremity of a comet's tail, thence the impregnating electricity being much diffused, and the cometary atmosphere very thin, but a very slender and weak impregnation could be communicated; whereas, had the same planet become immersed deeper, in the comet's tail, or nearer its nucleus the electrical discharge upon it would have been more intense, and its atmosphere in all likelihood more extensive. The Astronomical world are already acquainted with a very striking instance of the above in the comet of 1770, which, in passing between the two *new planets*, Ceres and Pallas, shared its *tail* amongst them, and has itself since (to us) become entirely lost or invisible; while these planets have each acquired tremendous atmospheres, viz. Ceres, an atmosphere 675 miles high, and Pallas, 468. Moreover, by referring to article 672, it will be seen that this comet was detained, and dragged about with Jupiter during six months. Such being the case, there can be but little doubt but that some of his moons were impregnated by the cometary influence at that visit. Having thus proof that the *tails* of comets do communicate atmospheres to planets, it will now become my duty to throw some light on that sublime era, "The Creation."

To be continued.

1040. DESCRIPTION OF THE PORTABLE FOUNTAIN (SELF-PREPARING) OIL-GAS LAMP, 1037.—The representation in the drawing is taken from my fountain self-preparing oil-gas lamp. It will be seen by comparing the cut 1037 with 354 that it is an improvement upon 354. Instead of the cistern N in figure 354, in figure 1037 I have substituted a fountain, by which change the oil is always kept at the same level in the gas-former. I have also found it an advantage to raise the alkohol *cup* nearer to the gas-former. By further comparing the figures it will be seen that upon my new plan the gas-former is much taller than upon the old scale; this change prevents the oil from boiling over. I judge it also right to state that I have found a brass gas former succeed equally well with a silver one. Instead of suspending the whole by a chain, as in the first form of the lamp, I have it fixed upon a small tin box, which may be japanned for neatness; (this contrivance of a tin box for it to stand upon, was a suggestion of a friend of mine, who made one or two of them, and

I have found it exceeding useful). A stop-cock will be seen in its proper situation by referring to the cut. This shuts off the oil between the burner and fountain when required. All I would further state is merely this—let the *jet-holes* of the burner be extremely small.

1041. Of Browning Copper Medals, Vessels, &c.—This operation is effected by either Venetian red, or purple brown, both being oxides of iron; if, however, the colour of either be not wanted separately, the two may be mixed together, to produce the desired tint. *To be continued.*

1042. THE SPECTRAL WAFERS, *or the accidental colour of bodies.*—Place three different coloured wafers, say red, violet, and orange, upon a piece of white paper in a triangular form, and fix your eyes steadily on them for a minute; then turn them away from the wafers to a blank part of the paper, and you will see three *spectral wafers,* but the colours will be different—the red wafer is represented by green, the violet by yellow, and the orange by blue.

Note. The phenomena of this spectral change of colour and representation where no wafers are, is accounted for on that law in vision, that an impression made on the retina (the thin narrow expanded tissue of the nerve of the eye) lasts for a certain time after the object itself has been withdrawn. This explains also the *turn wonder* or thaumatrope (828) and the reason of the change in the representation of the colour of the wafers is illustrated clearly in the article A mystery unveiled, 1009.

1043. A Remarkable Fact for Geologists.—Since the discovery of Australia, we are now sure that no very extensive tracts of land remain undiscovered, and we find that if all the seas and continents are laid down on a globe; and if we divide it into two hemispheres, it may be so done as to have nearly *all the land* on one side, and the other side almost entirely sea. There must therefore be an inequality of the density of the two hemispheres, and of course the polar axis and centre of gravity can not be the geometrical centre of the whole mass, and, of course, in the revolutions of the earth round its axis, its circumference will not describe a circle, but an eccentric revolution which must produce tides in the sea at every revolution.—*To be continued.*

1044. OF THE ZODIAC.—This is a *zone* or *belt* in the heavens, which, though distinguished by a name apart from the rest, has nothing peculiar in itself to distinguish it so particularly, but from its being the space, zone, or belt wherein the apparent motions of the sun, moon, and all the greater planets are seen to move in, it has been called the zodiac. This zone or belt is only about 18° in breadth, extending 9° on either side of the ecliptic. In this zone the sun and all the planets move from east to west.

1045. OF THE ECLIPTIC.—The ecliptic is that circle which the sun apparently describes from west to east among *the* stars, and which he completes in one siderial year of $365^d\ 6^h\ 9^m\ 9^s\ 6$. or in mean solar time, $366^d\ 6_h\ 9_m\ 9^s\ 6$.

1046. RULES FOR APPORTIONING THE HUMAN FIGURE IN DRAWING—*from Dr. Fresney,* and which has been approved of by Sir Joshua Reynolds.

1. From the crown of the head to the forehead, is the *third part* of a *face.*
2. The face begins at the roots of *the lowest hairs* on the *forehead,* and *ends* at the bottom of the *chin.*
3. The face is divided into three parts; the first contains the forehead, (or brow), the second the nose, and the third the mouth and chin.
4. From the chin to the pit at the top of the breast-bone, is two lengths of a nose.
5. From the pit at the root of the neck, at the top of the breast-bone, to the bottom of the breast, *one face.*
6. From the bottom of the breast to the navel, one face, *sometimes one nose more.*
7. From the navel to the genitories, one face; the apollo has one nose more.
8. From the genitories to the *upper part* of the knee, two faces.
9. The knee contains half a face.
10. From the lower part of the knee to the ankle, two faces.
11. From the ankle to the *sole,* half a face.
12. A man with his arms and hands extended, is, from the tip of the longest finger of each hand as broad as he is long.
13. From one side of the breast to the other, *two faces.*
14. From the shoulder to the elbow joint, two faces.
15. From the elbow to the joint of the little finger is *two faces.*
16. The *hand* is the length of a face.
17. The *thumb* contains a nose in length.
18. The longest *toe* is one *nose.*
19. The outermost parts of the paps, and the pit between the collar bones at the top of the breast bone of a female form an equilateral triangle.

1047. GUN-MAKING.—Mr. Creenen, the author of a little work on "The Gun," begs us to expose what he very truly terms a dangerous fraud, to which some gunsmiths have recourse; viz. that of making the body or main part of the gun barrel of the commonest iron to be found, and casing or plating them on the outside with a portion of fine twisted stub iron damascus, so that these barrels, when formed, shall appear to be twisted stubs, &c.; while, in fact, not one sixth of their composition is so. Now, (Mr. Creenen adds) you will say with me, what rascality! when I tell you that 19 out of 20 guns made at this time have all their barrels plated in this way; in fact, all double guns sold under £14, and single under £6 are so now. I would sincerely caution that class of sportsmen who use guns of that price, to be careful in purchasing, as I can assure them that they are not only unsafe, but their shooting powers are very trifling. The mode of detecting them is simple. Take out the breech, apply a little sulphuric acid to that part of the barrel where the breech joins, and it will not fail to show the extent of the sterling metal. A visit to the proof-houses will shew to the satisfaction of the most sceptic, the extent to which the fraud is carried.

1048. EXTRAORDINARY ADVANTAGE ARISING FROM KEEPING BEES.—John Ashman, cottager living at Wickhamstead, purchased in May, 1834, a swarm of bees for ten shillings. On the 17th of May, 1835, it swarmed, and cast in ten days afterwards; in a few days the bees again began to cluster at the mouth of the hive, upon which a small hive or cape was placed upon the top; he also placed a cape upon the swarm, both of which were in a few weeks taken off filled with the finest honey-comb, one weighing 16¾lbs., and the other 18lbs.; a second cape was then put upon each hive, five pounds more have been taken from the swarm, and one pound from the old stock. The old stock weighs 28lbs., and the cast 30lbs, after having been deprived of the above quantity of honey; so that by an outlay of 10s. in May, 1834, he has obtained three excellent stocks of bees, and 40lbs. of the finest honey-comb, worth between five and six pounds. Ashman made his own hives, and managed his bees, as directed by a little pamphlet distributed amongst the cottagers by the Suffolk Apiarian Society, written by Mr. J. H. Payne—*Hertford Reformer.*

1049. DESIGN IN DOGS.—A friend of mine, while shooting wild-fowl with his brother, was attended by a sagacious Newfoundland dog. In getting near some reeds by the side of a river, they threw down their hats, and crept to the waterside, and fired. They soon afterwards sent the dog for their hats, one of which was smaller than the other. After several attempts to bring them both together in his mouth, the dog at last placed the smaller hat in the larger one, pressed it down with his foot, and thus brought them both together. This fact need not be doubted. These individuals have both at different times assured me of its truth. I know an instance somewhat similar. A spaniel was endeavouring to bring a dead hare to his master. After several ineffectual efforts to carry it, or to drag it along, he contrived to get all the feet of the hare in his mouth, and in this way conveyed it to his master.—*Cleves Jour.*

1050. THE ARMED PRUSSIC ACID HARPOON.—A new whaling harpoon has just been invented, at the point of which there is a cavity, in which is placed a vial of prussic acid. The harpoon having been cast, the whale starts back, and by re-acting upon the line attached to the harpoon, the vial is crushed, and its fatal contents, mingling with his blood, very soon destroys his life.

1051. CUT WOOD ORNAMENTS AND VENEERS.—We are indebted to our ingenious neighbours, the French, for the discovery of a method of converting pulverised wood, or saw-dust, into a solid substance, by which curious wooded articles may be formed into moulds, at a trifling expense, out of rare and valuable wood. This invention will, in some measure, supersede the art of carving in wood, at this time so fashionable in household furniture and internal decorations.

1052. A PUZZLE FOR ASTRONOMERS.—By an eclipse of a small star by the moon, on the 5th of December, 1818, observed by Mr. J. B. Emmett, it appears, that the star was visible when really behind the moon's disc—an effect that could only be produced by refraction from the atmosphere of the moon.

Note. Such being the case, the reasons of those astronomers must go for nothing, who assert that comets are bodies of vapour, without any solid nucleus, because, (say they), stars have been seen through them. I will merely here refer to the calculations of professor Lamberte, of the University of Dorpat, with respect to the comet of 1811, which was so long visible; he calculated that it is but 57, and two-thirds smaller than the sun, 17 times larger than Jupiter, 25,104 times larger than our globe, 1,255,000 times larger than the moon, while its *orbit exceeds* that of all the planets of the solar system put together—*vapour with a vengeance!*

1053. ANATOMICAL DISSECTION.—A Committee of the Academy of Medicine in Paris, has lately made a report on a new method of preserving dead bodies for the dissecting-room. It consists in injecting the arteries with 12 or 15 quarts of a solution of acetate of alumine, concentrated to 20 degrees. The result has proved most satisfactory. Other experiments were made with sulphate of alumine, and with its chlorate, which were found less efficacious than the acetate.

1054. METALLIC ALLOY FOR DENTISTS TO FILL DECAYED TEETH WITH.—Prepare an amalgam of *eight* parts of bismuth, *five* of lead, *three* of tin, and *one* of mercury. A little of this amalgam put into a heated silver spoon will become soft, and may be stuffed into the decayed part of the tooth, where it will instantly fix in a solid state.

Note. This ought to be done when there is no inflammation in the tooth.

1055. CURE FOR BLISTERED FEET.—Simply rub the the feet, at going to bed, with spirits mixed with tallow dropped from a lighted candle into the palm of the hand. On the following morning no blisters will exist: the spirit seems to possess the heal-ing power, the tallow serving only to keep the skin soft and pliant. The soles of the feet, the ancles, and insteps should be well rubbed; and even where no blisters exist, the application may be usefully made as a preventive. Salt and water is a good substitute; and while on this head, (says Captain Cochrane, in his Travels in Russia), I would recommend foot travellers never to wear right and left shoes:—it is bad economy, and, indeed, serves to cramp the feet.

1056. The German Method to prepare Carmine.—Six pints of river water are boiled in a copper vessel; two ounces of powdered cochineal are then thrown into it, and well stirred. After six minutes boiling, sixty grains of powdered alum are thrown in, and the whole suffered to boil three minutes. The vessel is then removed from the fire; and the liquor drawn off with a syphon, and filtered through a lawn seive. The liquor is then placed in many china or Delft-ware vessels, and allowed to remain at rest for three days; when it is decanted, and the deposits dried in the shade. After three more days the liquor is again to be decanted; when it will have formed carmine of an inferior quality. *See the Chinese Method*, 1001.

1057. OF COMETS.—It appears that a comet has returned to our system in 1786, 1795, 1801, 1805, and 18$\frac{18}{19}$; it has returned five times, and, it appears, never ranges beyond the orbit of Jupiter. Its short period of little more than 3 and 1-4th years, and its mean distance from the sun, which is not much greater than twice that of the earth, connect it in a particular manner with the part of the system in which we are placed; of course, it crosses the orbit of the earth more than sixty times in the course of a century. Its elements, as seen in 18$\frac{18}{19}$, are as under:—

Passages of perihelion mean time at Gotha, Jan. 27th, 1819.

Longitude of perihelion, - - - - -	156°	59′	15″
———————— node, - - - - - -	334	35	0
Inclination of orbit, - - - - - -	13	37	0
Angle of eccentricity, - - - - -	53	2	58
Logarithm of half the greater axis, - -	0.34500		
Half the greater axis, - - - - -	2.2131		
Period, - - - - - - - -	1202.43 days.		

From these elements it appears, that this comet is at present in opposition to the sun, and may perhaps be seen by very powerful telescopes.

It appears by a report of Dr. Olbers, of Bremen, that the earth was in the direction of the tail of a comet. The sun, the comet, and the earth, were, on the 18th of June in the morning, so nearly in a right line, that the comet was to be seen on the sun's disk. According to calculation, the nucleus of the comet entered the sun's southern limb at 5^h 22^m A. M. true time at Bremen. It was nearest to the centre of the sun 1′ 27″ west, about 7^h 13^m, and issued from the sun's northern limb about 9^h 22^m. The comet, during this remarkable transit, was something more than thirty millions of miles distant from the sun, and about sixty-four million of miles from the earth.

1058. How to seal the end of a Glass Tube hermetically.—Soften its end in the flame of a lamp, and with another piece of tube softened in the same manner; bring their two ends into firm union. then soften the tube to be sealed a little higher up, and pull gently in opposite directions until they separate, when that which is heated will be diminished in substance, and may easily be sealed in the part required.—*See how to unite broken glass tubes,* 1010.

1059. Method of Gilding Live Fish.—The following recipe for gilding live fish is from the posthumous papers of Mr. Hooke. Put some Burgundy pitch into a new earthen pot, and warm the vessel till it receives so much of the pitch as will stick round it; then strew some finely powdered amber over the pitch when growing cold; add a mixture of three pounds of linseed oil, and one pound of oil of turpentine, cover the vessel, and boil the contained ingredients over a gentle fire; grind the mixture as it is wanted, with so much pumice stone in fine powder as will reduce it to the consistency of paint. When the fish has been wiped dry, this mixture is spread upon it, the gold leaf laid over it, and gently pressed down; after which, the fish may be immediately put into the water, and the cement will harden, and be in no danger of falling off. This may be performed upon cray-fish, carp, &c., without injuring the fish.

1060. How to make Port Wine.—To three quarts of red Burgundy wine, add one quart of Ratafia; mix them well, bottle and seal them.

A miller has just discovered at Dijon, a method of making bread with straw, chopped and ground. The invention may be of use in case of famine and sieges.

1060. Recipe to give to New Brandy the quality and flavour of Old Cogniac.—Pour into a quart of new brandy five or six drops of volatile alcali (ammonia), then shake the bottle briskly. In a few days this brandy thus prepared looses its harshness, and has as good a taste as old Cogniac, I may add that this mixture is not in the least injurious to the health, especially if the dose of ammonia be not exceeded.

1062. Artificial Chalybeate Water.—If a few pieces of silver coin, (says Dr. Hare), be alternated with pieces of sheet iron, placing the pile in water it soon acquires a chalybeate taste, and a yellowish hue, and in twenty-four hours flocks of oxide of iron appear. Hence by replenishing with water a vessel, in which such a pile is placed, after each draught, we may obtain a competent substitute for a chalybeate spring.—*Quart. Journal.*

Stuart's Useful Information for the People, No. 48,

Being No. 6 of the

PANORAMIC DICTIONARY.

A T M

1063. ATMOSPHERE.

Artificial, to make.

(See 163, Experimentalist, Page 32.)

1064. ATMOSPHERIC AIR.

Method of measuring the proportion of oxygen contained in it.

(See 181, Experimentalist, page 36.

1065. ATMOSPHERIC AIR

Deprived of its oxygen, will not support animal life.

(See 182. Experimentalist, page 36.

1066. ATROPHY.

This disease is a gradual wasting of the whole body, without difficulty in breathing, cough, or any marked fever, but usually attended with loss of appetite and defective digestion. It has been emphatically called a WASTING; and by medical writers, it has in general been termed *nervous consumption.* It arises from a want of nervous tone, in the assimilating functions of the lymphatic apparatus of the alimentary canal. The causes which commonly give rise to this disease, are excess in venery, fluor albus, continuing to give suck too long, drinking too free of spirituous liquors, and more especially severe evacuations, such as might be induced, by a long continued use of any kind of purgative; for instance, the system inculcated (by the vegetable pill venders) is the surest way that I have yet heard of for inducing this disease. These vegetable pill venders invariably cry purge away! whilst their dupes swallow by *half-crown* mouthfulls their dozes of what they call, and the people believe to be vegetables. Oh! how I grieve to see the bewildered infatuation and credulity of so numerous a portion of my country and generation. Oh! that man would study in a close manner, the laws of nature which regulate the several systems of universal existences, and he would no longer be the dupe of his fellow-man's artifices; he should no longer be (shall I use the word) gull'd, yes I say *gulled* out of the use of his reason upon *religious concerns*; neither would he, like a credulous, simple, unthinking child, be the victim of knaves and villains, whose reasoning sets at nought those *beautiful and beneficently arranged laws, which regulate the healthy operation of the different organic functions of the human body.* The word *vegetable* and *herb* would no longer to him be a cloak to the ignorance of the *catch penny* mauraders on his *health* and pocket. He would reason thus: Why, almost all pills given by *regular taught* practitioners in medicine are vegetables; and of what are purgatives generally composed? Why, of aloes, gamboge, bitter apple, squill, jalap, scammony, senna, &c. and these are all of vegetable origin. In the pharmacopœa of the Royal College of physicians of Edinburgh for 1817, there are but fourteen different kinds of pills, and eleven of them are entirely composed of twenty-three different kinds of vegetables; and the remaining three of the fourteen contain five different vegetables, as well as *mineral,* and they are *not purgative.* Thus it will be clearly seen that medical men deal entirely in *herb pills,* for the purpose of operating on the bowels by purgation. But after all, I ask what charm can there be in pills being made of herbs, whether prescribed by physician or *quack?* I think there is none. I should think if some fellow could invent *beef-pills,* there might be something to *gull* with; but vegetables—it is downright humbug to talk of them regenerating a diseased man by continued purgation. Just look at the difference between a parson who feeds daily on his tythe-pigs, rolling in health and fat; while the weaver who feeds on potatoes and *lang-kail,* is either *in* or fast hastening to the last stage of atrophy. The truth is, vegetables are very good in their own place; that is to say, when they do not expel the *beef.* But to set this subject in a clear and simple light, I will just give three receipts for *soup* for invalids; and leave the reader to his own choice to say which he considers best.

1st.	Ox beef,	2 lbs.
	Hare's flesh,	1 lb.
	Water,	6 lbs.

Let all be boiled together till three pounds of liquid remain, then add, $\frac{1}{4}$ ounce of salt; or

2nd.	Chucky-stones, (brook pebbles)	$\frac{1}{2}$ lb.
	Ox beef,	2 lbs.
	Water,	4 lbs.

Boil down to two, and season with salt; or

3rd.	Greens,	4 lbs.
	Cabbage,	1 lb.
	Parsley,	4 oz.
	Water, as much as you please.	

Boil down till concentrated in the highest degree to suit the palate.

Now, reader, I will leave you to make choice of what dish you please; but I, for my part, would assign No. 3 to the vegetable pill and herbmongers with their dupes, while I should take No. 1, or even

2 in preference (although made with chucky-stones) to myself. In short, the regular professor of medicine has erred in his judgment in the administering of purgative medicines, as well as the notorious empyric. They have both reasoned falsely when they practised on the supposition that medicines which pass rapidly through a man carrying with them the contents of the bowels, *purify the blood;* it is false in reason—it is false in fact. Medicines which keep up a continued drain from the bowels, prevent the extremities of the absorbents from sucking into the system the nutritious particles of the food; and thus inanition or *atrophy* is a sure consequence. Medicines to act on the system, and purify the blood must be such as shall be absorbed like the food, and by which disturbances shall not be excited in the delicate bowels in the exercise of their digestive functions in preparing and assimilating the aliment to the state of *chyle* fit for being absorbed. In attempting the cure of atrophy whether brought on by the excessive use of purgative pills, or whatever other cause may have induced severe evacuations. We must suppress the extraordinary evacuation by soothing medicines, and bring up the strength by nutritious diet. If it arise from a scrofulous habit, we most employ correctives of the vitiated habit, such as sarsæ, and other auxiliaries; if from a venereal taint, which is very often the case, then we must have recourse to alternatives, together with a milk diet; but in all cases severe purging must be avoided, and nutritious diet persevered in.

1067. ATTRACTION.

The terms attraction and repulsion, in the language of modern philosophers, are employed merely as the expression of the general facts, that the masses or particles of matter have a tendency to approach and unite to, or recede from one another under certain circumstances.

All bodies have a tendency or power to attract each other more or less, and it is this power that is called attraction.

Attraction is mutual—it extends to all bodies whatever, as well as their component elementary particles. It is not annihilated, at however great the distance we suppose them to be placed from each other; neither does it disappear, although they be arranged ever so near each other.

Proofs of Attraction.—That the power of attraction really exists, is obvious from the slightest view of the phenomena of nature. It is proved with mathematical certainty, that the celestial bodies which constitute the solar system, are urged towards each other by a force which preserves them in their orbits. It is further proved beyond any doubt, that this planetary attraction is possessed not only by the heavenly bodies as wholes; but that it also extends to the smaller particles of which they are formed, as may be evinced by means of the following experiments.

1st. If we place two or more globules of mercury on a dry glass or earthen plate, and push them gently towards each other, the globules will attract each other, and form one mass or sphere greater in bulk, but precisely the same in nature.

2nd. If a plate of clean glass, perfectly dry, be laid on a large globule of mercury, the globule, notwithstanding the pressure applied to it, continues to preserve its spherical form; and if we gradually load the plates carefully with weights, the globule will be flattened, and become thinner and thinner; but if we again remove the weights from the plate, the mercury will instantly recover its globular figure, and push up the glass which rests upon it.

In both these experiments, we see that there exists an attraction between the particles of mercury; in the first, the globules which are in contact with the plate of glass leave this substance completely, they attract each other, and form a sphere greater in bulk. A more inert fluid would in any case retain the figure it once possessed. It could not be endued with a globular form, unless a real reciprocal attraction among its particles took place, which in the latter experiments is still more striking, for there it is not only superior to gravitation, but actually overcomes an external force.

3rd. If a glass tube of a fine bore be immersed in water, contained in any vessel, the fluid will ascend to a certain height within the tube above its level, and its elevation in several tubes of different sizes, will be reciprocally as the diameter of their bores.

This kind of attraction which takes place as well in *vacuo* as in the open air, has been called capillary attraction. It is this attraction which causes water to rise in sponge, cloth, sugar, sand, &c. for all these substances may be considered as fine tubes in which the fluid ascends.

REMARK. The ascension of fluids in glass tubes of a fine bore, succeeds best when the inside of the tube has been previously moistened, which may conveniently be done by blowing through it with the mouth. And if the water be coloured with a little red or black ink, its ascension will be more obvious, particularly if the tube be held against a sheet of white paper.

4th. If two plates of glass, previously wetted, be made to meet on one side, and be kept open at the other, at a small distance, by the interposition of a sixpence, or any other thin substance, and then immersed in water, the fluid will ascend between the two plates obliquely. Its upper surface will form a curve, in which the heights of the several points above the surface of the fluid will be to one another reciprocally, as their perpendicular distance from the line in which the plates meet. The ratio of this attraction is therefore as the squares of the increments with which the plates open.

Here then we have other two instances that an attraction prevails among the particles of bodies. For in both cases, part of the fluid has left the contiguous mass, contrary to the laws of gravitation. It is drawn up, as it were, or attracted by the tube, or plates of glass.

5th. If we immerse a piece of tin, bismuth, silver, or gold, in mercury, and draw it out again immediately, the mercury will attract the metal, and the latter will carry with it a portion of the former, which will stick to it so obstinately as to be inseparable by mere friction.

There exists therefore an attraction between the different metals brought into contact with each other.

6th. If a small stick be dipt in water or any fluid, and drawn out again, a drop will be found hanging at the end of it of a spherical form. The drop is spherical, because each particle of the fluid exerts an equal force in every direction, drawing other particles towards it on every side, as far as its powers extend.

Thus, the very formation of drops obviously demonstrate that there must exist a cause which produces that effect. This cannot be gravity; for, agreeable to experience, that is rather an obstacle to the formation of drops, since by the weight of the particles, large globules resting on solid bodies are flattened, and their regular spherical form prevented.

To explain this phenomenon, their remains only the power of attraction, acting between the particles of the liquid body; for if it is supposed that the particles of a substance reciprocally attract each other with equal force, and their aptitude for being moved upon one another be great enough to overcome any impediment, it follows by the principles of mechanics, that the equilibrium of the attractive forces can only take place when the mass has received a globular form.

Hence it is, that all liquid bodies assume a sperical figure, when suffered to fall through the air, or form drops."—*Hooper.*

1068. BACON, *for bait.*

Bacon, mixed with old cheese and turpentine, is an excellent paste, and a good bait for chub, in winter months.

1069. BAITS.

To know at any time what bait fish are apt to take, open the belly of the first fish you catch, and take out its stomach very tenderly; open it with a sharp penknife, aud you will discover what he then feeds on. The procuring of good baits is not the least part of the angler's skill. They are usually to be met with at the shops where fishing-tackle is sold, but I shall hereafter particularly mention them in their order.

1070. BALLOONS IN MINIATURE.

(See 23, Experimentalist, page 7).

1071. BAPTISM.

A Greek word, signifying *immersion.* Men, being ever led by their senses, easily come to fancy, that what washed the body, likewise cleaned the soul. In the vaults under the Egyptian temples, were large tubs, for the ablutions of the priests and the initiated. The Indians, from time immemorial, purified themselves in the Ganges, and the ceremony still exists among them. The Hebrews adopted it baptizing all proselytes who would not submit to be circumcised; especially the women, (as exempt from that operation, except in Ethiopia only,) were baptized. It was as regeneration; it imparted a new soul among them, as it did in Egypt. Concerning this, see Epipanius, Maimonides, and the Gemara.

John baptized in the Jordan: he baptized even Jesus Christ himself, who, however, never baptized any one, yet was pleased to consecrate this ancient ceremony. All signs are of themselves indifferent, and God annexes his grace to such as he thinks fit to choose. Baptism soon became the principle rite, and the seal of Christianity. The first fifteen bishops of Jerusalem were all circumcised, and there is no certainty of their having been ever baptized. In the first ages of Christianity, this sacrament was abused, nothing being more common than to delay baptism till the agony of death; of this the Emperor Constantine is no slight proof. This was his way of reasoning: baptism washes away all sin; so that I may kill my wife, my son, and all my relations; then I shall get myself baptized, and so go to heaven; and he acted accordingly. Such an instance carried danger with it, and by degrees, the custom of delaying the sacred laver till death, wore off.

The Greeks always adhered to baptism by immersion; but the Latins, towards the end of the eighth century, having extended their religion over Gaul and Germany, and seeing that immersion in cold countries did not agree with children, substituted aspersion or sprinkling, in its stead, for which they were often anathematised by the Greek Church. St. Cyprian, bishop of Carthage, being asked, whether they, whose bodies had been only sprinkled, were really baptized, he answers, in his 70th letter, that several churches did not hold them to be Christians; that he does, but, withal, what grace they have is infinitely less than that of those, who, according to the primitive rite, had been dipped three times.

After immersion, a person became initiated, whereas, before, he was only a catechumen; but initiation required securities and sponsors, who were called by a name answerable to that of godfathers, that the church might be sure of the fidelity of the new Christians, and the sacred mysteries be not divulged. Wherefore, during the first centuries, the Pagans, in general, knew as little of the Christian mysteries, as the Christians did of the mysteries of Isis and Eleusis.

Cyril of Alexandria, in a writing of his against the emperor Julian, delivers himself thus: "I would speak a word of baptism, did I not fear, that what I say might come to those who are not initiated."

Children were baptised so early as the second century, it being, indeed, very natural, that Christians should be solicitous for this sacrament to be administered to their children, as, without it, they would be damned; and, at length, it was concluded that the time of administration should be at the end of eight days, in imitation of the Jews administering circumcision. The Greek church still retains this custom. However, in the third century, the custom prevailed, of not being baptized till near death.

Those who died in the first week, some rigid fathers of the church held to be damned, but Peter Chrysologus, in the fifth century, found out Limbo, a kind of mitigated hell, or, properly, the borders or suburbs of hell; whither unbaptized children go, and the abode of the patriarchs before Jesus Christ descended into hell; and ever since, it has been the current opinion, that Jesus Christ descended into Limbo, and not into hell itself.

It has been debated, whether a Christian could, int he deserts of Arabia, be baptized with sand; but carried in the negative: whether rose-water might be used for baptism; it was decided that it must be pure water, yet muddy water would do on an emergency. Thus, the whole of this discipline appears to depend on the prudence of the primitive pastors, by whom it was instituted.—*Voltaire.*

1072. BARBEL.

The barbel is a beautiful, well-shaped fish. The back is of an olive colour, the belly silver. It is speckled on the back and sides with small black spots. His make is long and roundish, and his snout sharp. His mouth is not large, but the upper jaw is more prominent than the lower. He has four barbs, or wattles, from whence he derives his name; two near the corners of the mouth, and two higher, near the end of the snout.

The barbel cannot well endure cold, and therefore in the winter time, is sick and languid, but in the summer clean and sound.

The flesh is soft and flabby, and in no great esteem. The spawn is unwholesome, purging both upwards and downwards, and is thought, by some, to be little better than poison. The male is much better than the female. Their principal season is September.

Their size is from a foot to a foot and a half long; the sort which are usually met with weigh about seven or eight pounds; yet a person at Staines caught one of twenty-three pounds weight; his bait was a bit of rusty bacon.

He is bred in most rivers. In the summer he haunts the swiftest and shallowest streams, where he lurks under the weeds, and works and routs with his nose in the sand, like a hog. Yet sometimes he retires to bridges, flood-gates, locks, and weirs, where the waters are swift and deep.

He never feeds off the ground, and will take any sort of worm, bits of bacon, old cheese, or new cheese, if kept in a linen rag dipped in honey two or three days to make it tough. They are a very subtle strong fish, and struggle hard for their lives, and will often pick off your baits.

His time of biting is early in the morning, in June, July, and August till ten o'clock, and from four in the afternoon till sun-set; but I prefer September and October before any other months, because then they retire to the deep holes. In the summer they come to the shallows about sun-set, where they may be easily taken with a scoured lobworm.

Your rod must be very strong, with a tough whalebone at the end. You must have ten hairs next the hook, but the remaining part of your line must be silk. If you make use of a wheel, as in trout-fishing, it will be so much the better.

THE
CHEMICAL EXPERIMENTALIST,
OR,
An attempt to allure by Experiment,
AND GUIDE BY REASONING,
THE ENQUIRER AFTER
RATIONAL AMUSEMENT AND USEFUL KNOWLEDGE,
TOWARDS THE CULTIVATION OF THAT SIMPLE & SUBLIME SCIENCE—
CHEMISTRY.

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THE MONITOR, on Consumption—THE SILENT FRIEND,—THE DIRGE, on Cholera—
THE ARCANA OF LIFE—THE PANORAMIC DICTIONARY—THE MUSEUM OF
THE ARTS—THE GREEN BOOK—ANATOMICAL REPRESENTATIONS—
THE RED BOOK &c. &c.

DECOMPOSITION is that death-like scene,
Where Nature's laws decree, incessant, universal change;
While COMPOSITION'S generative womb,
Prolific, gives birth, new form of life, and re-creates the whole.

PART SEVENTH.

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Stuart's Useful Information for the People,

Being No. 31 of the

CHEMICAL EXPERIMENTALIST.

IN resuming the publication of the CHEMICAL EXPERIMENTALIST, I must apologize for the time that has elapsed since the appearance of the *Thirtieth* number; and the best apology I can offer is an attempt to present you with a good *Thirty-first* and *concluding numbers.* Further to suit all parties, I have resolved to publish the PANORAMIC DICTIONARY in alternate numbers with the *Experimentalist,* so that they may be bound up separately by those who choose to do so: thus all parties may be pleased. My ideas of the *Philosophy of Nature* being my own, as now recording in the Panoramic Dictionary, and my recording of these ideas in conjunction with the Experimentalist having given offence to some, on account of differing so widely from the generally received opinions on that subject,) I have made this change, so that subscribers may take that part which best suits them, and avoid that which offends them; for I am resolved never to attempt to cram my own ideas on any subject forcibly down the throats of any class of men, but I am determined to record them, and it shall be left to your option whether you purchase them or not. This arrangement will allow me to develope my views more fully in the Dictionary than I otherwise could have done—thus the public and I have both a better chance of being pleased; and if so, I shall have much satisfaction in the change.

This being the season when the winter classes begin, I have judged it advisable to commence with some amusing and simple experiments for the benefit of the young students, which, though very concise, he will find more fully illustrated in the former part of this work. I have also judged it proper here to introduce a list of articles, with their most common prices attached, which should be provided by the student, to to enable him to perform his experiments at little expense.

1073. ACIDS—*which the Student should be provided with.*—Nitric Acid, 2 oz. price per oz. 2d.—Muriatic Acid, 4 oz. per oz. 1d. —Sulphuric Acid, a pound, 6d.—Tartaric Acid, 1 oz. per oz. 3d.—

Note.—The Nitric, Muriatic, and Sulphuric Acid bottles must be closed with glass stopples.

1074. ALKALIES—*which the Student should be provided with.* —Caustic Potass, 1 oz. price 6d. It must be kept in a glass-stoppered phial secure from air. Liquid Ammonia, 2 oz. per ounce, 2d.

1075. SALTS—*which the Student should be provided with.*—Cream of Tartar, (in crystals) 2 oz. 1½d.—Sulphate of Soda, 4 oz. 1d.—Sulphate of Iron, 2 oz. 1d.—Sulphate of Copper, 1 oz. 1d.—Alum, 2 oz. 1d.—Prussiate of Potass, 1 oz. 6d. (This is a very interesting and useful article for the young chemist.) Nitrate of Potass, (saltpetre) 2 oz. 1d.—Sal Ammoniac, 1 oz. 1d.—Acetate of Lead, (Sugar of Lead) 1 oz. 3d.—Carbonate of Ammonia, 2 oz· 3d.—Carbonate of Magnesia, 1 oz. 1d.—Super-Carbonate of Soda, (Carbonate) 4 oz. 6d.

1076. SUNDRIE ARTICLES—*which the Student should be provided with.*—Litmus, ½ oz. 2d.—Sulphuric Ether, 1 oz. 6d.—Gall Nuts, ½ oz. 2d.—The Black Oxide of Manganeze, ½ oz. 2d.—Sulphur, Chalk, Charcoal, Phosphorus, ½ oz. 2d. The phosphorus must be kept in a well stopped bottle covered with water. *(Care must be taken never to handle it without its being immersed, or at least wet with water.)* Oil of Turpentine and Olive Oil, of each, 1 oz.—A few iron filings, dry, clean, and free from rust.—Zinc, which must be granulated, *(See the method, Article* 370.*)* Sulphuret of Antimony, 1 oz. 1d.

1077. TO PREPARE RED CABBAGE LEAVES, SO AS THEY MAY BE PRESERVED FOR A LONG TIME.—Slice the red cabbage down, and dry them in a warm place till they are crisp, then let them be preserved in well-stopped bottles. Thus may the leaves be preserved for a long time fit for use.

1078. TO PREPARE THE INFUSION OF RED CABBAGE.—Put either a few of the *recent* or dried leaves into an earthen-ware pot, or *can,* and pour over them boiling water, which, having stood a little time, may be poured off, and will serve all the purposes of the *tincture.*

1079. TO PREPARE TINCTURE OF RED CABBAGE.—Let red cabbage be sliced into a clean glazed jar, then pour boiling water upon them; let the whole stand till cold, then decant the clear infusion (which will be of a fine blue colour) and mix with about one-eighth part of spirit of wine, to preserve it, and it will be fit for use. *This tincture spoils by long keeping.*

1080. TO CHANGE A DEEP BLUE COLOUR TO RED, BY ADDING A COLOURLESS LIQUID.—Pour a little of the infusion of red cabbage (1078) into a tumbler, or other tall glass, and add, drop by drop, sulphuric acid, (oil of vitriol,) and the infusion will instantly be changed to a beautiful red colour.

Note.—This experiment is an illustration of that general property of acids, which is to convert vegetable blues to red.

1081. TO MAKE THE SAME LIQUID ALTERNATELY RED AND GREEN, BY THE ADDITION OF TWO COLOURLESS LIQUIDS.—Take a little of the blue infusion of cabbage, mentioned in the last experiment, and add to it a few drops of sulphuric acid, and, upon stirring it, it will instantly become red; afterwards add a few drops of the solution of potash, and, upon stirring it again, a fine green will be produced, *instead of the red*, which colours may be reversed as often as we choose, by alternately adding the acid, (sulphuric) and the alkali, (potash.)

Note.—This experiment is a beautiful illustration of that general property of alkalies, which is to convert vegetable blues into green.

1082. THREE COLOURLESS LIQUIDS, WHICH, WHEN ADDED TO THE SAME VEGETABLE INFUSION, PRODUCE THREE DIFFERENT COLOURS.—Let three glasses (say dram glasses or tumblers of crystal) be half filled with infusion of red cabbage,—to one add a solution of alum, to another a solution of potash, and, to the third, a few drops muriatic acid (spirit of salt) and the product of the first mixture will be *purple*, of the second, *a bright green*, and of the third, *crimson*.

1083. A BLUE LIQUID, MIXED WITH A COLOURLESS ONE, WHICH PRODUCES A BEAUTIFUL GREEN.—Fill a tall glass with water, and add to it a little of the tincture of red cabbage, and stir it round, and it will appear of a beautiful deep blue; then pour into it a little colourless liquid ammonia, and stir it round, and the mixture will instantly become green. Next, let this green-coloured liquid be boiled, and it will regain its primitive blue colour. The reason of which is, because that the alkali is *volatile;* it is, therefore, driven off by the heat, in the form of ammoniacal gas. A solution of potash, or soda, would produce the same effect upon the blue solution; (viz. convert it into green,) but the green would remain permanent, though exposed to heat, these alkalies being what has been termed *fixed*, and will not fly off by heat.

1084. A BLUE LIQUID, WHICH BEING MIXED WITH A COLOURLESS ONE, PRODUCES A BEAUTIFUL CRIMSON-RED LIQUID.—Nearly fill a test-glass with water, and add to it a spoonful or two of the tincture of cabbage. The mixture will then be of a fine blue colour; then add a few drops of sulphuric, muriatic, or nitric acid, and stir it round, when it will instantly assume a bright red. This is an illustration of the property which acids possess of changing vegetable blues to red.

Note.—If, upon dropping a little tincture of red cabbage into any particular solution, and it be changed into a red colour, we then know that that solution *contains an acid*, and if this reddened solution becomes *blue again* upon being exposed to heat, we understand that the acid contained in the solution, is the *carbonic*, or else sulphurretted hydrogen.

1085. THE MANNER IN WHICH A BLUE LIQUID, CONTAINED IN A TALL GLASS, MAY BE RENDERED CRIMSON-RED AT THE BOTTOM, PURPLE IN THE MIDDLE, AND GREEN AT THE TOP.—Nearly fill a tall *strong beer glass* with water, and colour it blue, by adding to it a little tincture of red cabbage, then make it red at the bottom by pouring a few drops of sulphuric acid gently down the inside of the glass, (which from its great comparative specific gravity, will rapidly reach the bottom) and will convert the blue colour at the bottom into red; next, add a little liquid ammonia to the liquid at the top, which, from its comparative lightness, will keep at the surface, and will convert the surface into green. It will thus be green at the *top*, purple in the *middle*, and crimson-red at the *bottom*.

These are a few interesting experiments, illustrative of the properties which acids possess of turning vegetable *blues* into *red*, and also of alkalies which convert vegetable *blues* into *green*, and the whole of the experiments will not cost one penny of expense. The blue infusion of red cabbage is thereby found by your own experiments to be a test for both *free* acids and alkalies. For instance, if a little of the blue infusion of red cabbage were added to any liquid, and it became red by such addition, such change of colour would indicate that that liquid contained a *free acid;* if it became green, it would indicate the presence of a *free* alkali.

1086. MUFFINS—Mix 2 pounds of flour with 2 eggs, 2 ounces of butter melted in a pint of milk, and four or five spoonfulls of yeast; beat it thorougly, and set it to rise 2 or 3 hours. Bake on a hot hearth, in flat cakes. When done on one side, turn them.

Note.—Muffins, rolls, or bread, if stale, may be made to taste new, by dipping in cold water, and toasting or heating in an oven, or Dutch oven, till the outside be crisp.

1087. INK FOR WRITING ON ZINC PLATES.—Take equal parts of acetate of copper and muriate of ammonia, and reduce them to a fine powder, to which add one fourth part of lamp black, and five parts of water. Mix the whole well together in a stone mortar, at same time adding the water gradually, taking care to shake the composition well before it is used.

1088. VESUVIUS.—On March 13th, 1836, an eruption took place, when a new crater suddenly opened, and discharged a quantity of stones, &c. amid a volume of smoke. Next day the bottom of this new gulf presented many coloured fires and noises; smoke and flames also issued from the old crater.—*Literary Gazette, No.* 690.

1089. NEW METHOD OF DRYING PLANTS.—Dr. Hunefeld recommends first to cover them with the powder of lycopodium, and then placing them in a vessel containing chloride of calcium. By this method both their colour and flexibility will be preserved.—*Brande's Pharm.*

1090. INK PERMANENT IN THE AIR—*suitable for Monuments and Grave-Stones.*—M. Braconnet, of Nancy, has published a recipe for ink, which is very suitable for botanic gardens, and all open, wet situations, where names are required to be preserved permanent.

Take of acetate of copper, - - -	1 part.
Muriate of Ammonia, - - - -	1 part.
Soot, - - - - - -	¼ part.
Water, - - - - - -	10 parts.

Mix the powders all in a glass or porcelain mortar, adding 1 part of the water to mix them well; then adding the remainder. Shake the ink well from time to time. When it is used, we must write with it upon a plate of zinc (see 1037) and after a few days it will become hard, and cannot be effaced by atmospherical influence, or by rubbing. Any other mineral colouring matter may be used as well as soot.

1091. The Girdle of Safety for Swimmers.—The use of corks and bladders are strongly recommended by some, for persons learning to swim, while they are as much deprecated by others. I think they should not be made use of till the learner has been able to cross a narrow stream without them, with the precautions mentioned at articles 814 and 815, page 181, then corks and bladders may be had recourse to. But the *Safety Girdle*, (see article and figure 994,) should at all times be worn when swimming in deep water. This girdle should be a hollow belt made of Indian Rubber Waterproof Cloth, made so as to buckle round the waist close up below the arm-pits—it ought to have straps to buckle it firm and sure from the breast over the shoulders to the back, so that there could be no danger of its slipping off. A small swelling out of the belt should also be in front rising towards the mouth, and ending in a tube towards the swimmer's mouth; the back of the girdle should also swell out gradually, as seen in the figure 994, from the arm-pits towards the back. Thus, by this simple constructed belt, a safety is provided for the swimmer entirely under his own control. All that a swimmer has to do in using this belt, on entering the water, is merely to buckle it on, catch the end of the tube in his mouth, and blow into the belt till it be properly inflated, then turn a stop-cock attached to the tube, and bound away on his watery excursion. While on his voyage, if he feels it too bouyant, he can turn the stop-cock, and discharge some of the air contained in it: and again, if he feels himself become tired or sinking, and not so bouyant, he has just to turn the stop-cock again and blow in a mouthful or two of air. By this simple contrivance, the swimmer's head will always be kept up out of the water, by means of the inflated belt *coming up below his chin*, and his body will be prevented from sinking, as the bouyant belt becomes enlarged from the arm-pits backwards, and by constantly holding the end of the *inflating tube* in his mouth, he has always the entire command of his own safety. *Many a worse invention than my inflating tube has had a patent!*

1092. Method of destroying Mice, Rats, and all kinds of Vermin in their lurking places—*Annales de Chimie.*—Mix 4 parts of iron filings with 3 parts of flowers of sulphur together in a mortar with a pestle, moisten it with 4 parts of water, (boiling) and stir the whole with a piece of wood or glass, then again add 4 parts more of water, and introduce the whole into a retort; then pour upon the mixture oil of vitriol diluted with ten times its weight of water, and continue to add it gradually till the effervescence ceases. It is necessary that the beaks of the retorts be introduced into the holes of the vermin, and well closed around to prevent the escape of the gas in the apartment, and when the retort is withdrawn, the holes should be stopped up to prevent the escape of the gas, and stink of the dead vermin.

1093. THE MANNER IN WHICH LODGING-HOUSE-KEEPERS HUMBUG THEIR LODGERS, *(with a great apparent shew of honesty !) while they are at the very time* DIDDLING *them of the fair decoction of their Tea.*—The way this *trick of apparent honesty* is done is simply as follows:—Your landlady will not carry the *tea-pot* with the *tea* in it to the kettle, but insists that the kettle must be brought to the pot—the consequence is, that it will be ten chances to one if the water in the kettle is boiling when it arrives at the tea-pot, (as the landlady in such case will take good care it does not.) Such water will not extract the virtues of the tea; and the consequence will be, put in as much tea as you please, it will never be good; but whenever it is removed to the kitchen, it is drawn clean, and boiling water poured on, with a very small piece of soda added, and the leaf that could afford no cheer to the lodger, will afford a decoction strong in colour as moss-water for the lodging-mistress.

1094. A SECOND WAY TO HUMBUG A LODGER IN THE TEA-POT.—This is the most common. The landlady first fills up the Tea-Pot, (into which the tea has already been put) with boiling water, then lets it stand a few minutes to draw—then draws off for her own use the liquid contents, having all the aroma and cheering qualities of the tea, being the true fragrant decoction. She then fills up the tea-pot with more boiling water, and a piece of soda, which gives a dark brown strong looking decoction, but without the flavour of the tea; it is, in short, little better than tin. The only way to avoid both these tea-pot evils, is to put in your own tea, pour on the water yourself, and drink the decoction without letting it out of your sight.

1095. LAMP GLASSES—TO PREVENT FROM CRACKING.—A very simple but effective precaution is employed at Paris to prevent the breaking of lamp glasses by the sudden application of heat. Before they are used, a glazier cuts or scratches the base of the glass with a diamond, and afterwards sudden heat may be applied without danger.

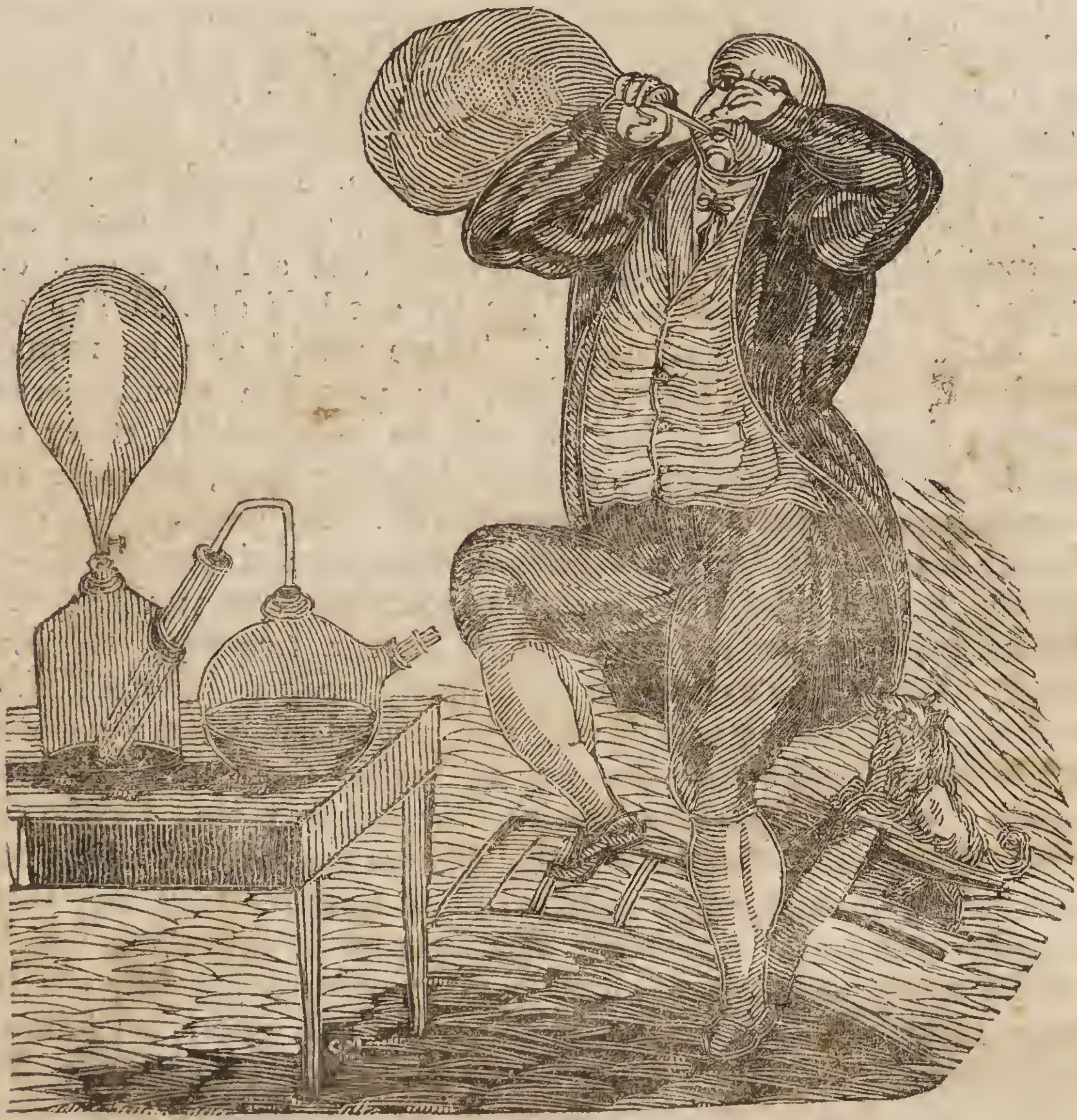
N. B.—No. 7 of the PANORAMIC DICTIONARY will be published this day week, in Glasgow; and in Newcastle and Manchester as early as conveyance will allow.

Stuart's Useful Information for the People,

Being No. 32 of the

CHEMICAL EXPERIMENTALIST.

1096. APPARATUS FOR PURIFYING, COLLECTING, AND BREATHING NITROUS OXIDE GAS.



1097. GAS OF PARADISE.—This interesting gas occupied our attention in some previous articles, (see Articles 131, 160, 161, 162, and 163,) but as it is expected soon to become a very popular article in the comforts of life, I have thought it would not prove unacceptable to my readers to give an additional discussion of some little nicities in its preparation and use, which ought to be attended to, so that its desired effects may at all times with certainty follow. In the cut at No. 4, Article 131, by a mistake in sketching the design, it was neglected to place the man in the attitude of breathing, holding his nose firm between his finger and thumb, it will be seen remedied (as it should be) in the figure 1096. If the nostrils be not kept shut, so as breathing may be prevented through them, the *pleasurable sensations* cannot be excited. It will also be advisable that the gas should be caught in the bladder, or oiled silk bag, as seen in the figure, after having been purified by passing through two receivers.

1098. DESCRIPTION OF A GAS OF PARADISE TAVERN.—In the arrangements for the accommodation of the customers to this *etherial* TAVERN, a great deal of expense may be avoided, which is at present a heavy burden, upon the present tavern establishments. Regular gas of paradise taverns would require bars, such as are now made use of by tavern keepers, also a back apartment for preparing the gas in, and a pretty large room, well carpetted and cushioned, after the manner of a coach. Perhaps it might be necessary to have two such rooms, for reasons I will immediately refer to. It would also be necessary to have a good supply of inhaling bags, say 1 doz. each, capable of containing *one quart*, 1 doz. of a quart and a half, a doz. of two quarts, a doz. of two and a half quarts, one-half doz. of five quarts, and half a dozen of four quarts. There would also be required to breath through, two silver, glass, or porcelain mouth-pieces for different sized bladder or bag, it will be indispensibly every necessary to have these different sizes of inhaling bags, in order to accommodate customers of different capacities. By preparing the nitrate of ammonia (article 158) ones self, as recommended (article 159) this gas might be furnished at about twopence per quart; therefore in a gasious oxide tavern a person might have a *twopenny exhilerating breath*, a threepenny *extatic*, or a fourpenny *seraphic* BREATH. The twopenny exhilerating breath might be inhaled behind the counter, or at the bar; but persons desirous of taking the extatic or seraphic breaths would be required to repair to the cushion room; for the violent emotions of extacy, and the seraphic demonstrations that might be excited, might be more safely indulged in, in a retired situation, than in, or at the open bar of a tavern. The pleasurable sensations, which follow the extatic and seraphic breaths, have been recorded by Sir Humphrey Davy, Wollaston, Herschell, Ure, and others, as follows:—irresistable mirth, exquisite pleasure, sensations of the most agreeable nature, toes, fingers, and ears *thrilling* most agreeably, like cords of musical instruments, a rapid flow of paradicial ideas, (it is on this account that I think a separate room would be required for females, at least till its effects were clearly ascertained on them as well as males; as at the commencement of any new undertaking, it is as well to err on the safe side,) a propensity to laugh, dance, and lastly, a strong inclination to jump over chairs and tables, feeling so *light* as almost to be under the necessity to mount and fly. It is on account of these last extraordinary enthusiastic fits of extacy, that I have judged it right to recommend a carpeted room, surrounded with cushions. The advantages which breathing the gas of paradise has over the common methods of raising the animal and mental spirits, by means of *tippling* and *bibling* at strong stupifying drinks are many; first, there is no waste of time. A person in a state of despondency may, in two minutes, breath himself into extacy. Secondly, where the excitement of spirits cause swearing, fighting, and every form of vulgar brutality, an excess of breathing the *Gas of Paradise* excites, on the contrary, paradicial ideas and enthusiastic fits of extacy, while the toes, fingers, and ears are thrilling with all the feelings of musical vibration. In short, it is a cleanly, time-saving, exhilirating, angelizing *ether*; whereas spirituous liquors are besotting, brutalizing, devil-inspiring draughts, which in the end clog the ideas, where the *etherial oxide* sets them free.

1099. SUMMARY OF IMPORTANT FACTS.—When we see the sun or moon near the horizon, and bear in mind the density of the air near the horizon, and our distance from the centre of the atmosphere, being distant from it by the radius of the earth, nearly 4000 miles, and probably less than 100 miles from the point at which it first begins to refract light, we can easily understand *why the luminary should* appear much larger there than when it is near the zenith. Looking-glasses are "silvered" in the following manner:—Thin sheets of rolled tinfoil are laid on a plane table of smooth stone. Mercury is then spread on it, and the glass, previously polished and well cleaned, is laid on it. Heavy weights are then laid on the glass, and by this means the mercury and tin are strongly pressed between the glass and the stone. The tendency of candle light is to diminish colours, or lower their tint—so that it requires a practised eye to distinguish yellow from white, green from blue, and some of the reds from brown. *Internal reflection* acts like a mirror, and when viewed obliquely, throws the reflection where the other light is not seen. Thus a picture is often so injudiciously or highly varnished, that it looks more like a mirror than a picture, except in one situation, and that is often the very one in which it cannot be seen.

Accedental colours seem as if they were purposely suited for each other, inasmuch as they look brighter when in contrast side by side, than when they alternate with other tints. In this sense, red and green, and yellow and blue, are the accedental colours of each other. Any one may see the effects of this by laying one slip of bright red on a piece of bright green, and another on a piece of bright blue, when although the two slips have been cut from the same uniform piece, just the moment before, no one would believe upon retiring a little, and looking at them in the same light that they could possibly have been of the same colour, the one will appear so much brighter than the other. All the other accedental colours may be found in the same way, and the finding them is both an amusing and useful recreation. When the eye is fatigued with the observation of one colour, the accedental one is that to which it becomes most sensitive, and which affords it the highest gratification. If the eye has been fatigued by red, it may be afforded relief, and delightfully soothed by green. On the other hand, if we have been a whole day in the flowerless meadows, among the green grass, the smallest red flower or red berry is a treat. Another agreeable illustration of the same fact, is simply to invert the head, so that the eyes are turned completely upside down, and then view the landscape that had just previously been viewed in the natural erect position. Heat, like light, cannot be weighed in the scale, or measured by the line—we have no means of connecting heat with the general properties of matter—we do not know that it is a substance; all that we can know of it are its appearances, and the effects which are produced by it on substances. The colours used for painting on pottery are all put under the glaze,—they are ground in boiled oil to the consistence of copperplate ink, and printed from copperplates on soaped paper,—the soaped paper does not absorb the colour. The direct light of the sun soon extinguishes a fire, and it not only hides the light of a candle, but reduces the flame to nothing. It is difficult to keep a tolerable fire in a room which has a large window opposite the chimney. A fire too that has been languid all day, becomes brisk when darkness sets in. Now why should light extinguish the fire? For the very same reason that "a candle lighted at both ends" would consume faster than if it were lighted at one end. The light and the fire are both consuming the same substance, and though, at the commencement, the fire may be the more powerful, the light gets the better of it in the end. On viewing the disk of the moon through a good and great magnifying power, it has the appearance of a *mass of ruins*—the light parts of the moon are elevated, and the dark parts are hollows. Seen through a good instrument, the lunar mountains are truly sublime;—they rise in vast heads and masses, which no foot could ascend. The bottoms of the dells are strewed with vast fragments, as if a world had been broken in pieces. Chromate of Potash, one part dissolved in 16 parts of water, and bloating paper dipped in it, is good for making *moxas*. It is also an important salt, having the property of preserving animal and vegetable matter, and the bi-chromate is useful as a disinfuting agent. Kreosote, the anti-putrescent principle of Pyroligneous acid, and of wood smoke, is obtained from the tarry matter which distills over in making vinegar from wood. This tar is distilled, and neutralized with carbonate of potash. The oil is again distilled, and treated with a solution of potash of sp. gr. 1. 12. Sulphuric acid is now added in a dilute state, till the oil is set free. The human brain in its normal state contains from 2 to 2½ per cent of phosphorus, whilst in idiots it contains but from 1 to 1½, and in madmen, 3, 4, or even 4½.

1100. TO POISON MOLES—*Annals de Chimie.*—Collect earthworms, kill them, and mix with them the powder of nux vomica, and strew it in the holes and paths of moles.

1101. COPAL VARNISH FOR FINE PAINTINGS.—Fuse 8 lbs. of the clearest African gum copal, and when completely run to fluid, pour in 2 gals. of hot oil, old measure. Let it boil until it will string very strong, and in about 15 minutes, or while it is yet very hot, pour in 3 gals. turpentine.

1102. BAROMETER.—An instrument to measure the weight of the air—it is commonly called a weatherglass. It is constructed simply as follows:—a glass tube rather more than thirty inches in length, shut at one end, and open at the other, is filled with mercury, and by applying the finger to the open end, by which the mercury was poured in, so as to prevent the escape of any of the mercury, the tube, (now filled) is turned upside down, and before the finger is removed, its open end is plunged into a cup of mercury. Then remove the finger, and the mercury will remain in the tube, at a height somewhere between twenty-eight and thirty inches, indicating a weight of mercury balancing in equilibrio a column of air of equal weight. This is a true barometer, or measurer of the weight of the air.

The following indications of the barometer, may be relied upon as connected with the state of the weather, being rules founded on observation.

1. A *rising* of the barometer indicates the approach of fine weather; a *falling* shews the approach of foul weather.

2. In sultry weather, the fall of the barometer indicates thunder. In winter, the rise of the mercury shews frost. In frost, its fall indicates thaw; and its rise indicates snow.

3. Whatever sudden change in the weather follows a change in the barometer will last but a short time. For instance, if the rise in the mercury is immediately followed by fair weather, it will last but short; and if foul weather suddenly follow a fall of the barometer, it will last but a very short time.

4. If *fair* weather continue for a number of days, and the mercury continues to descend, there in general is a long succession of *foul;* and on the contrary, if the mercury continues to rise steadily for several days, while the weather is still *foul,* a long succession of fine weather will in all probability succeed.

5. The mercurial column *fluctuating,* shews *unsettled* weather.

6. A low state of the barometer indicates *high* winds, not far distant from the place of observation.

A column of mercury, whose base is *one inch* square, and thirty inches in height, (that is about the height which in general balances the atmosphere) weighs nearly *fifteen pounds.* Then the pressure of the atmosphere is just *fifteen* on the square inch, and as the surface of the human body contains about 2000 square inches, it follows, that the whole pressure of the air on it, amounts to the enormous weight of 30,000 pounds.

1103. CHARRING OF THE HUMAN BODY AND ANIMAL SUBSTANCES, OR, AN EXPOSITION OF BONAPARTE BREATHING.—A pamphlet published at Florence gives an account of a strange discovery by Girolamo Legato, the accuracy of which is attested by the principal professors in that city. It appears that Legato, while traversing the deserts of Africa, in 1820, for the purpose of perfecting his map, discovered in one of the hollows which the whirlwind had plowed up, a completely charred human body, the flesh and bones of which were in good preservation. It struck him that the process of charring could only have been effected by the scorching sand, and that if the heat of the sand had, in this instance, effected the complete disiccation and carbonization of animal substances, it might be possible to effect something similar by artificial means. On his return he commenced his experiments, and at length succeeded in imparting to the limbs and bodies of animals solidity and indestructible durability. By this process whole bodies, as well as individual parts, acquire a thoroughly firm consistence, which is more decided according as the respective parts are harder or softer. The skins muscles, nerves, veins, fat, blood, all undergo this change, without its being necessary to remove the intestines, which assume the same consistence. At the same time, the colour, form, and character in general, remain unchanged; no smell is perceptible, and both joints and limbs remain flexible and moveable, as when alive. When bodies have acquired this consistency, neither damp, air, moths, nor water can effect them. The weight is but slightly diminished. Not a hair is lost, on the contrary, they are rooted more firmly than ever. Birds and fishes lose neither skins, scales, nor colours; and in like manner insects and worms remain perfect in every respect. Legato's cabinet contains many specimens of this novel and singular discovery. One of the most remarkable is a table composed of two hundred and fourteen pieces joined together. The observer would take them for so many different kinds of stone, and yet they are nothing more than portions of the human members.

There can be little doubt, I think, but that the representation of Bonaparte *breathing* that was exhibited round the country, about twelve months ago, was nothing else than the dead body of a man, dried in this manner, with a turnspit spring turning an oval wheel within his chest which would give the heaving appearance of the chest as in breathing.

1104. HOW TO COOK A POTATOE.—To cook a potatoe seems simple enough, and yet we scarcely ever find it well done. At the tables of the great, a good potatoe is never seen, because, if not eaten the very moment it is boiled, the potatoe is worth nothing, and also because the refinement of peeling helps to destroy the savour. Another mistake is to serve this vegetable in a covered dish, whereby the steam condensed by the cover falls upon the potatoe, and it becomes sodden and waxy. Do not buy washed potatoes from the shop. Get them with the mould about them, and do not wash it off until just before you use them. If they are steeped in water long before they are boiled, they become stale and watery. Put them into plenty of cold water with some salt. When they are about half boiled, throw away the water, and pour fresh boiled water upon the potatoes from a teakettle, adding to it some salt. Let it boil up briskly. When you have ascertained with a fork that the potatoes are very nearly done, throw in a cupful of cold water to check the boiling. The water will soon boil up again, and the potatoes will crack. Let the water then be drained off, and the potatoes served up in an open dish with their skins on. The water upon them will evaporate the instant they are in the dish. They must be eaten at that moment; in ten minutes their fine flavour would be gone.

1105. MEANS OF DARKENING THE HAIR.—It is well known that there are various methods in use for altering the colour of the hair; in general the object is to change red or sandy hair to a darker hue, to brown or black. Preparations of lead, silver, and bismuth, are employed for the purpose, lime or ammonia being first used to remove the fatty matter of the hair; and a very common agent is a mixture or compound of lime and oxide of lead, called prombite of lime. In these cases, as it is not difficult to attain the desired end, so neither is to detect what has been done, by close inspection, or by re-agents. The blackening depends on the formation of metallic sulphurets by the union of the lead, silver, or bismuth, with the sulphur either of the hair, or of a solution of sulphuretted hydrogen applied for the purpose. Now, muriatic acid will extract the bismuth, and nitric acid the lead, from hair thus dyed; and by the proper tests, these metals may be readily detected in the resulting solutions. When nitrate of silver has been used, the process of detection will be a little different. Treat the hair with a solution of chlorine, by which chloride of silver is formed, which is soluble in ammonia, and again precipitable on the addition of nitric acid, in which state it may easily be detected.—*Medical Gazette.*

1106. BEST WATER FOR TEA.—Rain water, when pure, is very soft, and, on that account, ought to be selected for the making of all infusions, such as tea, since the solvent powers of water are great in proportion to its freedom from earthly salts.

1107. TO CURE BUTTER.—Take two parts of the best common salt, one part of sugar, and one part of saltpetre, beat them up together, and incorporate them well; then mix one ounce of this composition with 16 ounces of butter; work them into a mass, and close up for use. Butter cured in this simple and easy manner is so infinitely superior to common salt butter, that it will in any market fetch 30 per cent more. It will keep for years, and indeed it ought not to be used in less than a month or six weeks after curing, or it will not have acquired its mellow and pleasant flavour.

1108. SODA BREAD.—A correspondent of the Newry Telegraph gives the following receipt for making "soda bread," stating that "there is no bread to be had equal to it for invigorating the body, promoting digestion, strengthening the stomach, and improving the state of the bowels." He says "put a pound and a half of good wheaten meal into a large bowl, mix with it two tea-spoonfuls of finely powdered salt, then take a large tea-spoonful of super-carbonate of soda, dissolve it in half a tea-cupful of cold water, and add it to the meal; rub up all intimately together, then pour into the bowl as much very sour buttermilk as will make the whole into soft dough (it should be as soft as could possibly be handled, and the softer the better,) form it into a cake of about an inch thickness, and put it into a flat Dutch oven, or frying-pan, with some metallic cover, such as an oven lid or griddle, apply a moderate heat underneath for twenty minutes, then lay some clear live coals upon the lid, and keep it so for half an hour (the under heat being allowed to fall off gradually for the last fifteen minutes,) taking off the cover occasionally to see that it does not burn. "This," he concludes, "when somewhat cooled, and moderately buttered, is as wholesome food as ever entered man's stomach." Wm. Claker, Esq. of Gosford, has ordered a sample of the bread to be prepared and kept for sale at the Markethill Temperance Soup and Coffee Rooms.

1109. DYE FOR THE HAIR.—M. Brandes has been analyzing a liquid sold at Berlin for dying the hair, and finds it to be a spirituous infusion of the shell of green walnuts, made aromatic by lavender water, and not in the least prejudicial to the health.

1110. INDIAN NOTIONS OF GEOGRAPHY.—Of the natives of India, the Rev. Dr. Duff says,—"Their geography is a stupendous system; as will appear, if you take a flat surface, and suppose a central island, consisting of the known and habitable world, surrounded by a circular ocean seven hundred thousand miles in breadth; and this by a succession of seven alternate continents and oceans, in concentric circles—oceans of sugar, cane-juice, wine and milk—each doubling the extent of the preceding, till they reach more than five times the actual distance between our earth and the sun. 'Compared,' say they, 'with your puny geography, is not this magnificent?'"

1111. RECEIPT FOR FASTENING LEATHER UPON METAL.—A. M. Fuchs, of Bairere, says, that in order to make leather adhere closely to metal, he uses the following method. The leather is steeped in an infusion of gall nuts; a layer of hot glue is spread upon the metal, and the leather forcibly applied to it on the fleshy side. It must be suffered to dry under the same pressure. By these means the adhesion of the leather will resist moisture, and may be torn sooner than be separated from the metal.

NOTICE TO CORRESPONDENTS—'K. K.' must, I fear, attribute his want of success in preparing the LUCIFERS (article 263) to ingredients not being genuine, as thousands have made them by the same receipt. In short, that simple receipt has reduced their price from 6d. to 1d. per box. See that they be well dried before you try them, and let the sand paper be fine.

*** In next number (33) will be given an article on Ballooning, shewing facilities, advantages, and improvements in ballooning, beyond every thing that has ever been contemplated.—J. K. S.

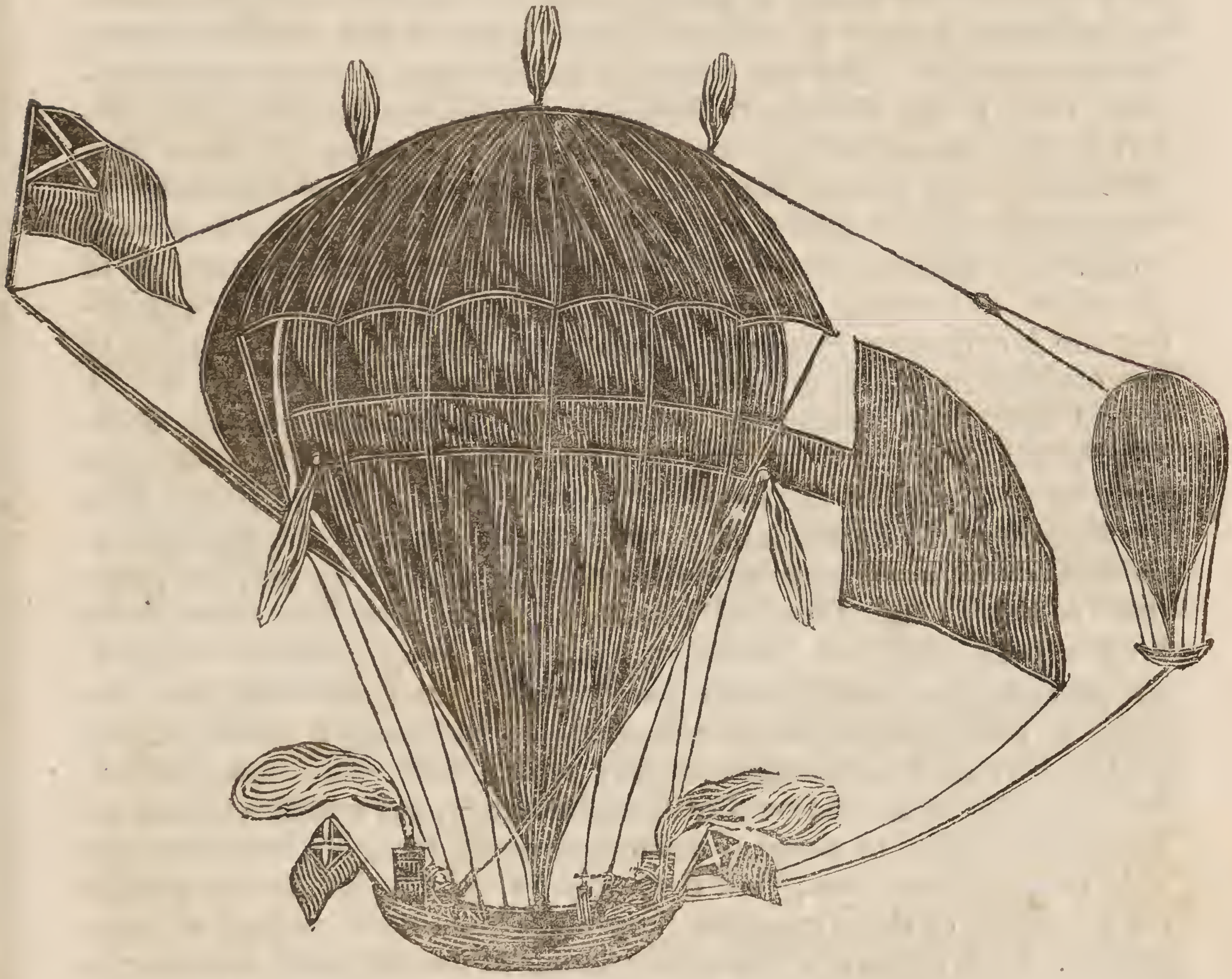
CALDWELL & SON, PRINTERS.

Stuart's Useful Information for the People,

Being No. 33 of the

CHEMICAL EXPERIMENTALIST.

1112. DR. STUART'S NEWLY INVENTED SATELLITE BALLOON, OR, AERIAL STEAM SHIP.



1113. DESCRIPTION OF THE SATELLITE BALLOON, OR AERIAL STEAM SHIP.—In order that my readers may the more easily understand my description of the above invention, I would recommend them to turn back to articles 606, 609, 610, on the *Balloon Steam Boat.* In these articles are given explanations of the mode in which I have suggested that steam power may be applied to the propelling of AERIAL *vehicles.* But in the cut 1112, as well as 606, there is this error in the figure, viz. that the steam is shown as if blowing off, upwards, downwards, and backwards at the same time, which, if acted upon to the letter would be ridiculous. Such was merely done to illustrate more distinctly than could otherwise have been done, the situation and manner of letting off the steam. But to remove every vistage of confusion that may have been induced, let us just once for all recapitulate, if the steam *cocks* are all shut excepting say *only one*, the consequence will be that the balloon must be driven in exactly an opposite direction. It may also be proper to notice the steam must be conveyed from the steam generator in the boat or *car* beneath to the different jets for outlet by flexible tubes carried along outside the balloon. In the drawing 1112 I have added a bowsprit, to which might be conveyed a steam jet which, from ejecting the steam at the extremity of the lever, would possess an immense power in directing the bows of the machine in the course required. But the principle improvement to my steam balloon, 606, is the SATELLITE Balloon attached to the main balloon, 1112. By means of my satellite balloon, I mean to shew that *Aeronauts* may ascend into the air, and remain there so long as they have a mind; and I, for my part, with this auxiliary to a well-constituted balloon, would feel no scruple at making the circuit of the *globe*, or starting on a voyage to the Indies, America, or exploring the North-west Passage. Before entering on the description of the manner in which my satellite or auxiliary balloon shall act, I would refer the reader to article 640, being an extract from M. Pelletan's memoir on the dynamic effects of steam, when he shall be surprised at the immense power, without any of the friction of machinery, to be attained by this simple manner of using steam. To those who have been attending to steaming in the air, as practised of late in the Vauxhall Balloon, their attention must have been struck with the immense weight or cargo taken on board. So many as *ten persons* were passengers in her, but that was nothing to what she might have carried, as the master of the vessel said she would have carried twenty with great ease, and, indeed, had it not been for the help of the fastening ropes which held her to the ground, fifty, or as many porters as could hang by her, were not able to keep her down; had they held on, but for Mr. Green letting off a portion of the hydrogen, they must have been carried off altogether. Such a power of buoyancy being at our disposal, let a cargo of sulphuric acid, water, and granulated zinc, for forming hydrogen be taken on board, and prepare the gas on board the boat or car. Let the gas be conveyed into the *satellite balloon* by means of a flexible tube, (those prepared by Mr. M'Alpine, Glassford Street, are the best for the purpose that I have seen.) When the satellite is full, if the buoyancy of the main balloon be diminished, the gas may be drawn by an air pump from the satellite, and forced into the main balloon; and if a flexible tube be used for emptying as well as filling the satellite, it is plain that the generation of gas may be continued at the same time as the injection is going on into the large balloon;—thus it is plain to be seen a balloonist may remain in the air so long sa he chooses. Another advantage of the satellite balloon is this, viz.—if any accident were to befal the large balloon, such as a rupture of its substance or fire, the voyagers might betake themselves to the satellite, and thus secure a second chance for their life. Another improvement to this balloon is the *parachute* like an umbrella fastened over the top, as seen in the figure, so fitted to be entirely at the command of the voyagers, who should be able to make it apply close to the balloon when not required, but when a too rapid descent is feared. the parachute may be extended like a canopy aloft. In short, in my satellite balloons, I see the possibility of ballooning being carried to any extent, so as to effect any purpose. What is to hinder the voyager carrying *a dozen* or more *empty balloons* in the car, when by this means he would be enabled, when gas required to be let off, to catch it and keep it in store for his future wants? Moreover, by such satellite she might dispatch a messenger at any point of his journey, and perhaps cast anchor till his return.—*Ballooning to be continued with other improvements, so as to render it as fashionable, and far safer than either coaches, canals, or railroads. In short, I will not leave it till I have put it beyond the possibility of any accident befalling human life thereby.*

1114. EXTRAORDINARY EXPERIMENT.—*From the Somerset County Gazette.*—"We feel much pleasure in communicating to our readers the following singular experiment of our now celebrated neighbour, Andrew Crosse, Esq.

The public are aware that Mr. Crosse has been recently pursuing a series of researches into the process of crystallization by means of his galvanic batteries, and that he has made discoveries which have thrown quite a new light upon science.—Some weeks ago he prepared a siliceous fluid for the purpose of crystallization. He heated a flint to a white heat, and then plunged it in water to pulverise it. The silex, thus reduced, was saturated to excess with muriatic acid. Tde mixture was placed in a jar—a piece of flannel was suspended in it, one end of which extended over the side, and thus, by capillary attraction, the liquor was slowly filtered, fell into a funnel, and thence dropped on a piece of ironstone from Mount Vesuvius, upon which were laid two wires connected with either pole of the battery. We should state that the ironstone had been previously heated to a white heat, so that no germs of life could have existed upon it. Mr. Crosse made his daily observations at the wires to discover the beginning of the process of crystallization. On the 14th day he saw some small white specks upon the stone. Four days afterwards they had elongated, assumed an oval form. He concluded that they were incipient crystals. Great was his surprise on the 22d day to find eight legs projecting from each of these white bodies; still he could not believe they were living beings. But on the 26th day his surprise was complete; there could be no doubt they moved, they fed, they were perfect insects. Eighteen or twenty of them have since appeared; many persons have seen them, but there is no record of *such* an insect.

It is in form something like a mite. It has eight legs, four bristles at the tail, and the edges of the body are very bristly. Its motions are visible to the naked eye—its colour is grey—its substance is pulpy. It appears to feed on the siliceous particles in the fluid.

The most extraordinary circumstance in this phenomenon is the nature of the fluid in which this insect lives and thrives. The acid instantly destroys every other living being.

But a second trial has confirmed the fact beyond a doubt. Another portion of silex was prepared in the same manner, and reduced to a gelatinous form, but *without the acid.* A coil of silver wire was suspended in it from one of the poles of the battery, and the other pole was also immersed so as to send through the mass an incessant stream of the electric fluid. About three weeks afterwards, Mr. Crosse examined the poles to search for crystals, and in one of the coils of wire he found one of these strange insects. This proves that it is produced from the silex and *not* from the acid.

Mr. Crosse, with his usual modesty, has contented himself with stating the fact, without attempting to account for it. He is in correspondence with Professor Buckland upon the subject, and the learned Professor has suggested an explanation, which it will be for future observers, by repeated experiments, to confirm. We should state, that the insects were principally found at the negative pole of the battery.

A German naturalist has recently discovered that silecious and other rocks are chiefly composed of the remains of insects. May not the germs of some of them, released from their prison-house, and placed in a position favourable to the developement of vitality, have sprung to life after a sleep of thousands of years?

We shall endeavour, from time to time, to make known to our readers the past and future discoveries of our talented friend. Already others have stolen many suggestions and experiments, and passed them upon the world as their own, for Mr. Crosse conceals nothing of his knowledge, and, for the sake of science, communicates his discoveries, careless of the fame which is his right. We trust that by thus early publishing and awarding them their proper owner, we shall prevent much unfair appropriation of the honour of his brilliant researches by those who have no title to it.

1115. SUMMARY OF IMPORTANT FACTS.—During a thunder-storm a person may know his danger by observing a watch with seconds, allowing one mile for every 4½ seconds that intervenes between the flash and the crack, as sound travels at the rate of 1142 feet in a second, while the velocity of light is so rapid, (in such small distances) as not to be calculated. The principal *frosts* of this country are produced by N. E. winds, and the *thaws* by S. W. winds. To explain which, remember that the earth's surface moves slower at the poles than in our more southern latitudes, hence air coming thence moves slower with us than the earth's surface, and thus acquire an easterly direction from this part of the earth's surface moving from west to east, faster than the atmosphere. Without *light* green vegetables become first yellow, that is, they lose their blue colour which contributed to produce their green; they afterwards lose their *yellow*, and become *white.* This is verified by the blanching of cellery, by excluding the light. The spots on the sun's disk have been shewn to be excavations through its luminous surface, and has been supposed to be the cavities of solar volcanoes, through which planets and comets have been ejected by explosions. If a piece of amber be rubbed, it attracts straws and hairs, whence the discovery of *Electricity*, and also its name, from *electron*, the Greek word for Amber. M. Pilatre du Rosiere, and M. Romain ascended in a balloon from Boulogne, in June 1785, when after being half an hour in the air, and at an elevation of one mile, the balloon took fire, when the two adventurers were dashed to pieces by their fall to the ground. The vacant spaces in some parts of the heavens, and clusters of stars in their vicinity, have caused Herschell to conclude that the nebulæ or constellations of *fixed stars* are approaching each other, and will finally coalesce in one mass. The earthquake at Lisbon in 1755 was perceived in Scotland, in the peaks of Derbyshire, and in many parts of Europe very distant from each other: its percussions travelled at the rate of 13 miles in a minute, (the velocity of sound.) The earthquake of 1693 extended over 8000 miles, (see Goldsmith's History.) Philosophers have supposed that *matter* and *spirit* are equally unperishable; and that on the dissolution of vegetable or animal organization, the matter returns to the general *mass of* MATTER, and the spirit to the general *mass of* SPIRIT, according to the original idea of Pythagoras. The Torricellian vacuum is the vacancy at the top of the column of mercury in a barometer; and the Boylean vacuum is the exhausted receiver of an air pump, so named in honour of these two philosophers. The seeds of the *fern* are supposed to exceed a million, and 1012 tobacco seeds weigh one grain, and the seeds of one plant exceed 360,000! Water increases in bulk during freezing from 1-14th to 1-22d part. The living principle in fish, vegetables, eggs, and seeds resist the power of congelation. Herschell has discovered a volcanic crater on the moon's disk, whose broad burning mouth is three miles broad. The cause of a south wind producing rain, arises from its coming from a warmer climate, and parting with its heat in our latitude by passing over our colder earth, it parts with much of its moisture, that was dissolved in it by the southern heat. Again, a second cause of rain is a stream of N. E. wind, which is comparatively cold, and a stream of S. W. wind, which is comparatively hot. Let these two winds be existing at the same time, and the N. E. (being the colder and uppermost) will fall down on the warmer expanded S. W. current, and the whole will become colder; thus clouds are immediately produced. It is extremely hazardous to marry an *heiress*, as she is very often the last of a *diseased family*, as families affected with *hereditary diseases*, such as, scrofula, consumption, and madness, become *gradually* EXTINCT!

When a pencil of silver is put between the gum and the upper-lip, and a plate or pencil of zinc beneath the tongue, a sensation of light is perceived in the eyes, so often as the extremities of the silver and zinc are brought into contact. If a bar of *iron* be set upright in the earth in this part of the world, it will in a short time become magnetical; the lower end of it possessing northern polarity, and the higher southern polarity.—The earth is a great magnet!

1116. ZAFFRE INKS.—Take zaffre and dissolve it in aqua regia (see nitro-muriatic acid.) Dilute the solution with a little pure water, to prevent it making too strong an impression on the paper. When the paper is heated, it assumes a *fine green blue*, and if this same zaffre be dissolved in nitric acid, it will form an ink of a reddish colour, when exposed to heat. Both these inks resume their primitive colours when they cool.

1117. FLAME PRODUCED, AND QUICKSILVER FROZEN, BY MEANS OF THE SAME BODY.—If nitric acid be mixed with oil of CLOVES, a most violent flame will be produced; and if this same NITRIC ACID be poured on snow, it instantly dissolves it, and produces the greatest degree of cold yet known—by which quicksilver was first frozen in 1750.

1118. THE CAUSE OF BACON BECOMING RANCID, AND HOW TO PREVENT IT.—If bacon be hung up in a warm kitchen with much salt adhering to it the fat outside becomes yellow and rancid; but if it be washed with much cold water, after it has imbibed the salt, just before it is hung up, it will not become rancid.

1119. DR. FRANKLIN'S EXPERIMENT OF THE CORK, OIL, AND WATER.—Cut a piece of cork about the size of a wafer, having a point on one side of it about one-sixth of an inch in length, projecting from its *circumference*. Dip it in oil, throw it in water, and it will continue to revolve so long as the oil leaves it, or till the whole surface of the water is covered with it,—it requires a large surface of water.

1120. FAIRY RINGS.—*Useful as directing whether Houses ought or ought not to be placed in certain situations, so as to avoid being struck by lightning.*—What has been popularly denominated fairy-rings, are those parts where streams of electricity have struck the ground. There are situations whither from their eminence, or their moisture, or metallic points of rocks beneath the earth's surface, which seem proper to attract and discharge *thunder-clouds.* This supposition is strengthened from the circumstance that many *fairy-rings* are generally in the neighbourhood of, and intersect each other. The knob of a cloud like a cylinder is drawn to these spots, and is discharged thereon—thus indicating untoward spots to erect buildings on.

1121. THE UPAS, OR POISON TREE OF JAVA.—The effluvia of this noxious tree has depopulated the country for 12 or 15 miles around, not only quadrupeds, birds, and fish, but even vegetables of all kinds are destroyed by its effluvia, and the surface of the earth all around is quite barren, intermixed only with the skeletons of men and animals. Two youuger trees are said to be springing up beside it. The poisonous arrows are prepared with its juice, and condemned criminals are sent to the tree, to get the juice, and are pardoned if they bring back a certain quantity; but by the registers that are kept, not one in four returns—three out of every four being destroyed by its malignant exhalations.

1122. VERATRINE.—Four-and-twenty year ago, when the *eau medicinale D'Husson* was at the acme of its reputation, Mr. James Moore wrote two letters, in which he endeavoured to show, by a number of curious facts, that this specific for the gout was indebted for its powers to white hellebore *(veratrum album.)* It afterwards appered, that the bulb of the meadow-saffron, *(colchicum autumnale*), and not the white hellebore, was the principal ingredient. Mr. Moore's ingenious supposition, however, though wrong in form, was right in substance, for the veratrum and the colchicum both owe their virtue to the same alkaloid—veratrine. This potent remedy acts with extreme violence, even in very minute doses, and its effects are most marked when applied to a mucus membrane. A small quantity put into the mouth excites most abundant salivation; if snuffed up into the nose, it causes sneezing of dangerous intensity; a quarter of a grain introduced into the intestinal canal produces abundant evacuation.

1123. INTOXICATING POWER OF DIFFERENT LIQUORS.—Professor Beck, of New York, undertook a series of experiments upon wines, at the request of some Temperance Societies. The results agree generally with those of Brande, published twenty years ago. The alcohol or spirit existing in wine is not combined with vegetable infusion, but merely mixed with it. The union grows more perfect as the wine gets older; and hence, old wines are less intoxicating than new. Supposing the portion of alcohol in wine to be the measure of its effects on the brain, the following table (the fractions rejected) is given by Mr. Beck, as representing intoxicating power of different liquors. Brandy, 100; strongest Madeira, 48; weakest Madeira, 36; Port, (average) 41; Bucellas, 35; Sherry, 33; Torres Vedras, 36; Sauterne, 24; Claret, (average) 21; American wine, 21; Metheglin, 20; Ale, 20; Beer, 14; Cider, (average) 9. It will be observed, that a bottle of the strongest Madeira is nearly equal to half a bottle of Brandy, and a bottle of average Port rather exceeds two-fifths of a bottle of brandy.

1124. METHOD OF COATING BUSTS AND PLASTER CASTS, SO AS TO GIVE THEM THE APPEARANCE OF MARBLE.—Into a wooden tub or trough put a strong and warm solution of alum. Into this plunge the bust or plaster cast previously made perfectly dry, and let it remain there from fifteen to thirty minutes; then suspend it over the solution, that the superflous portions may drain off; and when it is cold, pour over it a fresh portion of the solution, and apply it evenly by a sponge or cloth. Continue this operation until the alum has formed a crystallized coating over the whole surface. Put it aside, and when perfectly dry, polish it with fine sand-paper or glass-paper, and complete the polish with a cloth slightly moistened with pure water. A wooden vessel is best for the solution, warmed by steam from a boiler, because metals are apt to colour the solution. This coating gives greater solidity to the substance, and possesses the whiteness and transparency of the finest marble. It stands the attacks of moisture in any apartment—is less subject to become soiled, and is as easily cleaned as marble. In this manner, excellent copies may be obtained of antiques, as well as moderns, at a price little exceeding common plaster casts.—*American Journal of Science and Arts.*

NOTICE TO CORRESPONDENTS—T. P. (formerly signed V.) is referred to article 453 for the cement suitable for the purpose of turner's cement, but a receipt for the real TURNER'S PITCH or CEMENT will be given in an early number. Wm. M‘G. is informed that the types for last number were entirely set up before his note came to hand, and this present notice is the earliest that it could possibly receive;—by referring to article 557, No. 15, he will perceive that when three glasses are used at the object end of the telescope tube, they are *placed close together.* With respect to what the focal distances of the object glasses ought to be, article 552 will explain. In short, if your eye-glass be one inch focus, and your object-glass 40 inches, it will magnify 40 times; if the eye-glass be 2 inches focus, and the object-glass 40 inches, it will magnify only 20 times; and if the eye-glass should be 20 inches focus, and your object-glass 40, it would magnify only *two times.* For these reasons the telescope tube should just be as long as the focuses of both the object and eye-glasses added together. For these simple reasons also, it is advisable to have the telescope tube in two or more pieces, so that it may be extended or contracted in length to suit the distance of the object, the eye, and the focuses of any kind of object or eye-glasses.

T. K. Bonhill is informed that it has been out of my power to meet him along with the lovers of science and *rational amusement* at Bonhill so early as I had contemplated, but I will fulfil my promise soon.—J. K. S. A Correspondent from Beith is informed that his algebraic solution to a query in the EXPERIMENTALIST has fallen aside; if agreeable, another would be acceptable. A Subscriber is in error who supposes my publishers had any intention of disobliging him by not supplying him with early single numbers. Nos. 7, 8, 9, 10, 11, and 12 are entirely out of print as single numbers, but a few parts are still on hand; and to oblige subscribers who may not have the second part complete, I have given instructions that any of the above numbers (if clean) will be taken back, and complete parts supplied instead—subscribers paying the difference.

Next Saturday will be published No. 34, *with two octavo plates of the human body.*

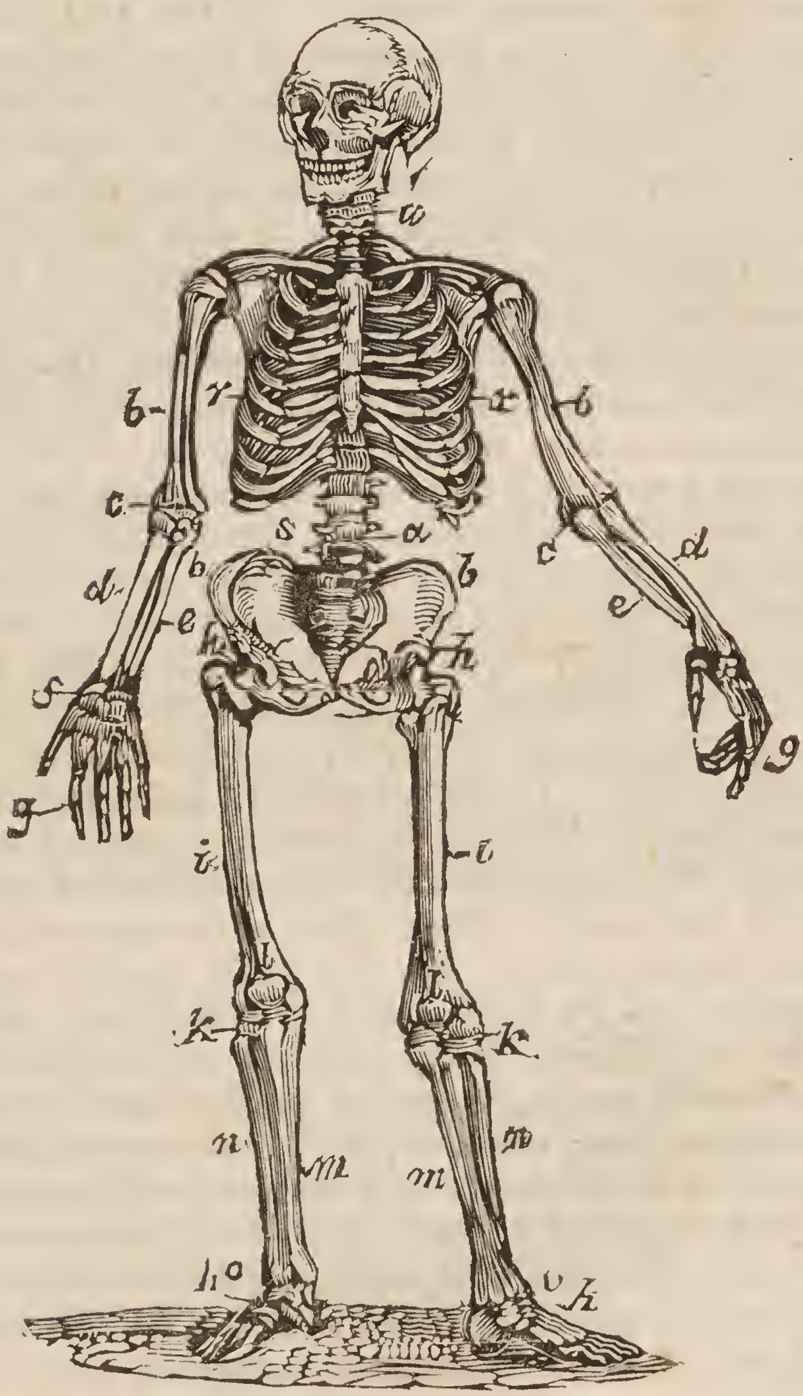
CALDWELL & SON, PRINTERS.

Stuart's Useful Information for the People,

Being No. 34 of the

CHEMICAL EXPERIMENTALIST

1125. THE HUMAN SKELETON.



a, *a*. The spine, or back bone.
b, *b*. The upper arm.
c. *c*. The elbow-joint.
d e, *d e*. The lower arm.
f, *f*. Joint of the wrist.
g, *g*. Fingers.
h, *h*. Ball and socket-joint of the thigh.
i, *i*. The thigh.
k, *k*. The knee-joint.
l, *l*. The knee-pan, or patella.
m n, *m n*. The leg.
o, *o*. The ancle.
p, *p*, The foot.

1126. REMARKS UPON THE HUMAN SKELETON, (1125.)—In submitting this number of the *Chemical* Experimentalist to public notice, I shall present no apology, nor solicit any pardon for introducing into this book the subject of the present number. The fastidious may criticise as they please;—I have resolved in each number to give a part of what is uppermost in my *own* mind, and from my being determined to allow my mind to be occupied with nothing but what is really and truly useful, it follows, that although I may not be arranging this work (in strict reference to its title) according to the fashions of the day, nevertheless each number must, and shall (in my opinion) contain something that is truly useful. It has been truly said, that "the works of the Lord are great; sought out of all them that have pleasure therein." All the works of the universe are great, but I do consider the studies of MAN, by *Man* HIMSELF, as one of the greatest and most interesting study he can occupy his time with, in reference to the *ultimates* of universal existence. Moreover, if it shall add any weight to my assertion, that the study of nature is a *most interesting study.* I shall add the testimony of St. Paul, who affirms, that the "invisible things of God, even *his eternal power and Godhead* are understood by them." Here is grand encouragement for the student of nature, viz. the attainment to the intelligible demonstration of the being of the God of nature, here in this glorious field of circulating *effect,* the *sceptic* may not, cannot, remain a sceptic long; the *ever-turning page of nature* is that divine revelation which damns the doubts of the doubter; there can be no infidels to *that revelation*: "Its lines have gone through all the earth, its words to the world's end"—"The heavens God's glory do declare;" whoever presumes to say he doubts it, must be a stupid, senseless, unintelligible *fool!* therefore without more preface to a subject, which, if people knew their true interests better, required none. I shall proceed to make my remarks upon the human skeleton. The human body is composed of organs and parts, destined to perform the functions essential to its life, among which we find the bones. Their office is to support the *soft parts,* and to defend those *vital organs,* the brain, lungs, and heart from external injury. At an early period of conception, the bones may be said to be in a state of jelly, but they soon acquire a degree of firmness, becomes cartilaginous or *gristle,* and ultimately *bone.* At the twenty-first year, it is said, the bones cease to grow in length, but they increase in thickness and diameter till the thirtieth year. MAN is then supposed to have arrived at the acme of symmetry and perfection. (For the *Composition of Human Bones,* see article 371, page 77.) In referring to the skeleton, (1125) we shall begin at the *head,* and descend downwards in making our observations.

1127.—THE SKULL.—The skull or case for the *brain* is a vaulted cavity of bone for lodging and defending the brain. This case is composed of *eight* bones, which are, the frontal-bone, forming the whole fore-part of the skull; the two parietal-bones forming the upper and middle part; the two temporal bones composing the lower part of the sides; the occipital-bone making the whole hinder part and part of the bottom; the ethmoid-bone in the fore part of the base; and the sphenoid-bone in its middle. These several bones joined together by *dove-tailed* seams form a chamber of bone to lodge the brain in. In reflecting on the substance and structure of this part of the skeleton, the mind at once assents to the rational provision made to protect that intellectual-electrical battery, the soft, pulpy brain from external injury. The bones of the face are fourteen in number, but to which I shall not particularly refer at present, as it would extend my description to too great a length, as at this time I design only to describe the more prominent characters of the skeleton.

1128. THE SPINE.—*a, a,* in the skeleton refers to the backbone or spine, it is a long chain of bones twenty-four in number, which form a tube or canal through their whole length for lodging the spinal-marrow in, and defending it from harm. This spinal marrow is just a continuation of the brain: here again we find a rational provision made to protect that delicate substance, while at the same time, the number of bones allow a flexibility, so as to bend in every useful direction, without danger to the inclosed prolongation of the brain.

1129. THE THORAX.—*r, r.* The trunk, thorax, or chest, is that large cavity, intended to afford a secure and commodious residence for the lungs and heart. It is formed behind by *twelve* of those bones, which form a part of the back-bone or spine. At the sides it is formed like a cage, by the ribs passing from the vertibræ of the back to the breast-bone in front. It is necessary to remark that only *seven* of the ribs on each side are inserted into the breastbone; the other *five* do not reach the breast-bone, but run into, and are joined into each other. and are known by the name of false ribs.

1130. THE SUPERIOR EXTREMITIES.—The shoulder is composed of two bones—the clavicle, or collar-bone, and the scapula, or shoulder blade. *b, b,* is the upper arm-bone; it is attached to a flat surface on the shoulder-blade, which forms the joint. d, e, is the lower arm, and is composed of only two bones, the one extending on the side of the little finger from the wrist to the elbow is called the Ulna,—the other bone is called the radius. *f, f,* is the joint of the wrist; it is composed of eight small bones, and *g, g,* are the fingers.

1131 THE INFERIOR EXTREMITIES.—Each of the inferior extremities comprises a thigh-bone, two leg-bones, with the knee-pan and the foot. *i, i,* are the thigh-bones, one only in each extremity; and *m*, *n*, and *m*, *n*, are two bones to each leg. *n*, *n*, on the outside of each leg are called the *fibulæ*; and *m m*, on the inner and fore-part are called the *tibia*. The knee-pan is the last bone of the leg; it is thick, of an oval or rather triangular form; and serves as a lever for the muscles to act upon between the thigh and leg.

1130. RETROSPECT OF THE SKELETON.—When the bones of an animal are connected together, after the soft parts have been removed, the whole is called a skeleton; on its dimensions depend the height, and, in a great measure, the breadth and strength of the human body. Had this frame been constructed of fewer bones, our actions must necessarily have been rendered constrained, and less convenient; we find it therefore wisely divided into numerous pieces, for enlarging the sphere of motion; while all its divisions are peculiarly and admirably fitted to the various uses for which they have been designed.

The head we have seen to form a spheroidal case for lodging and defending the brain within its cavity, while its elevation above the rest of the body places the seat of the soul in a position at once commanding, and the best suited to her superior attributes. In the head and contiguous to the emporium of sense, we also see situated the organs of sight, hearing, smelling, tasting, and of speech; the more rapidly to transmit information to the brain, and also to obey its commands.

From the head we see descending a large chain of bones, called the spine, or back-bone, and reaching down to the extremity of the pelvis. This boney pillar not only supports the head, and superior parts of the body, but also affords a canal along its descent for safely lodging that continuation of the brain called the spinal marrow; and being divided into several small bones, connected together by elastic substances, and having a great number of processes projecting like so many small handles, for the muscles to take hold of and work by, it allows the neck, back, and loins, a sufficient motion.

From the upper part of the spine, the ribs extend out on each side, and meeting at the breast-bone before, they form the cavity of the chest for lodging and defending the heart, and the organs of respiration.

The lower part of the spine, supporting all the parts of the body which are superior to it, is itself received in a wedge-like form, and supported by the bones of the pelvis. These bones are so constructed as to serve at the extremity of the trunk not only as a kind of basin for sustaining some of its viscera, as the intestines, &c. but also as a medium of connection between the body and the lower extremities, affording a firm and safe support to the former, and producing the necessary motion at the hip-joints, by rolling upon the round heads of the thigh-bones.

In viewing the superior extremities, we observe, that the base of each is placed in a situation, the best calculated for the limb to per-

Plate 2

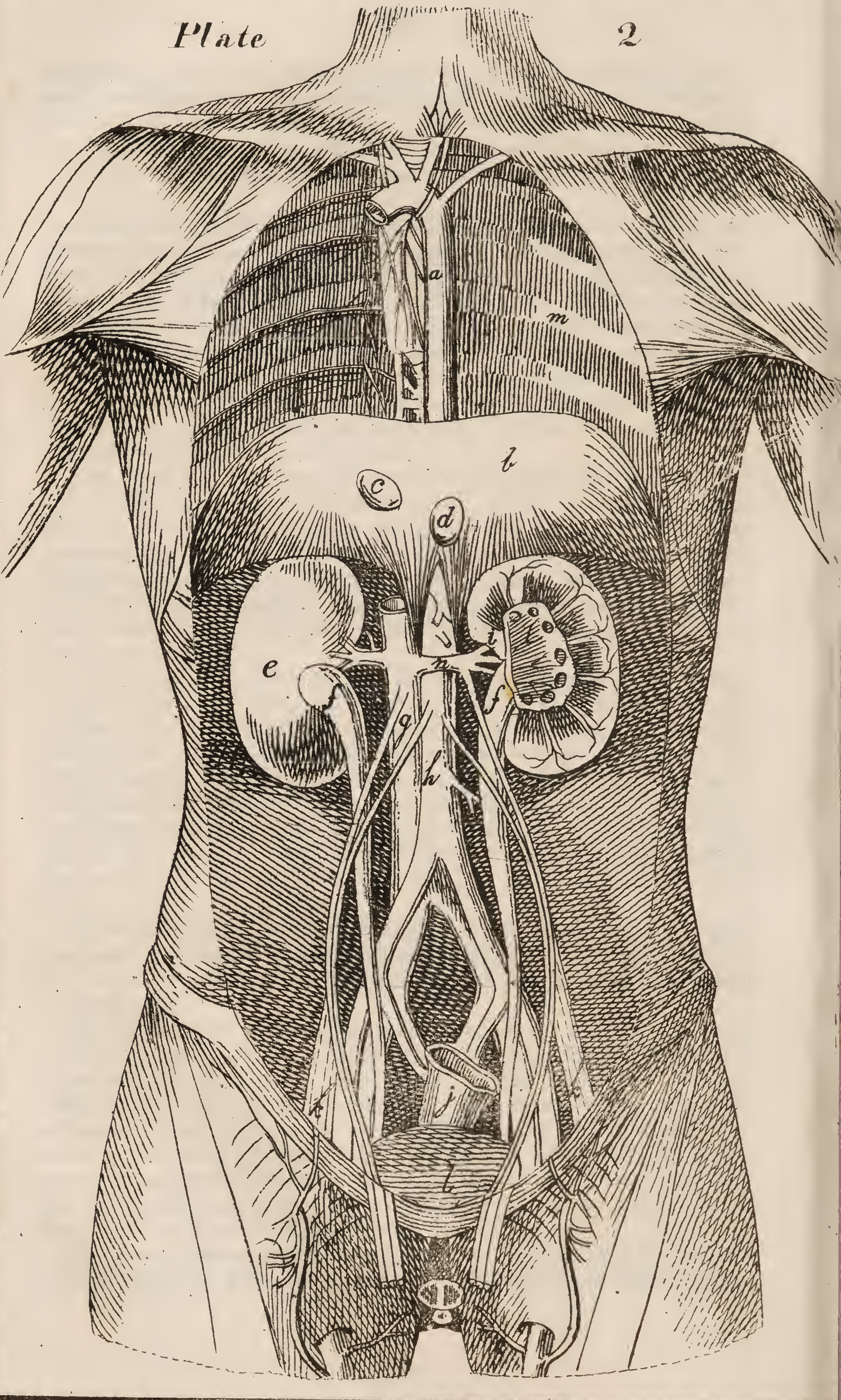
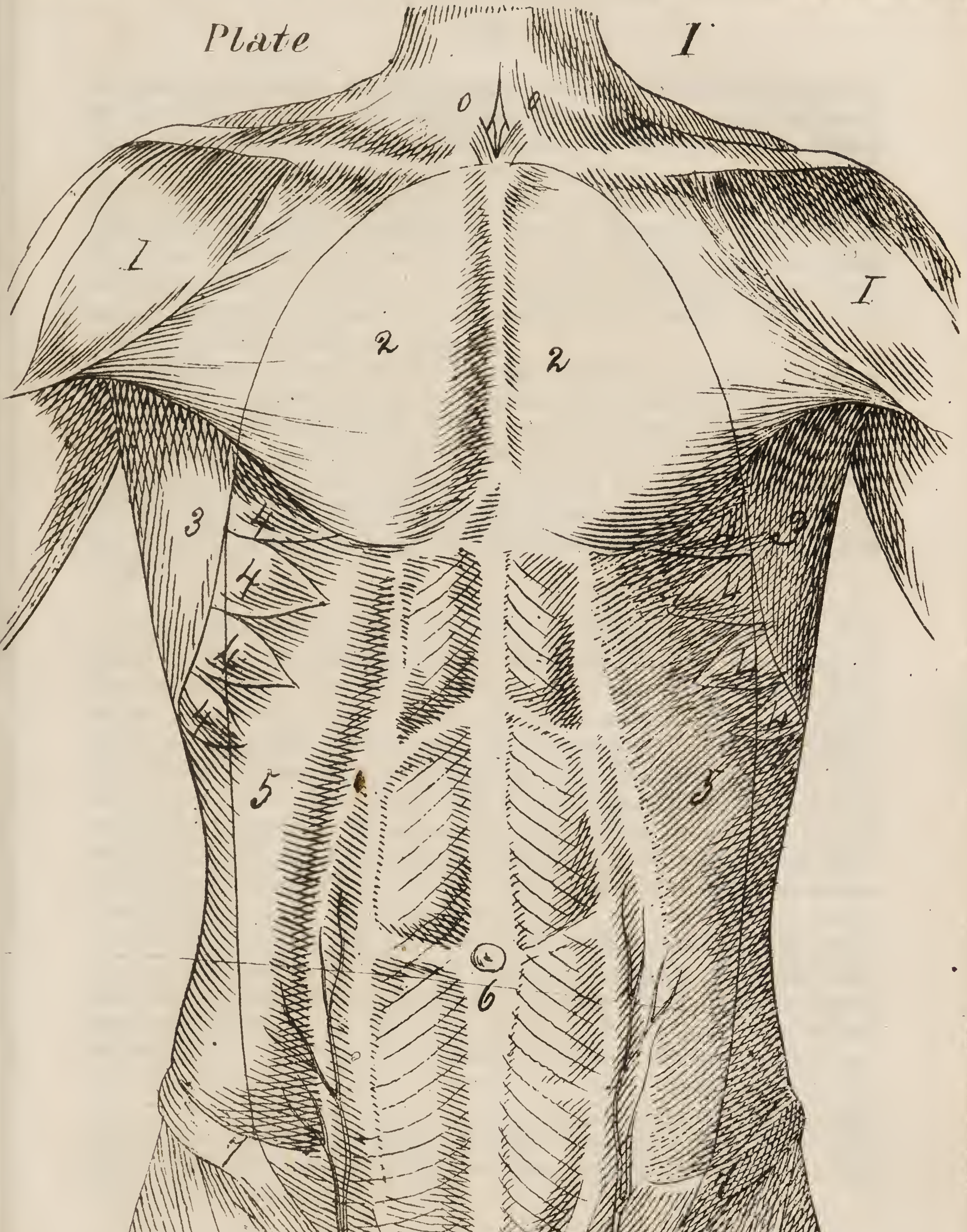


Plate I



form all its motions, and at the same time to defend from injuries the head and chest; while the muscles which are necessary to work the limb, serve as a defence and covering to the vital parts within the ribs. The division of each extremity into several bones, and their peculiar connexions, are intended to produce large motion: that at the shoulder is sufficiently free for describing a circle; at the elbow, the arm may be bent to an acute angle, whilst the wrist is capable of much motion, as are the thumb and fingers; the whole limb producing a collective motion sufficiently great for all the purposes of necessity and convenience.

The inferior extremities we also see divided into several bones, and for the purposes of motion; but serving as two moving columns for the support and carriage of the rest of the body, they are necessarily stronger, and their joints firmer and more confined: hence the thigh-bone has less motion than that of the arm: the joint of the knee is stronger than that of the elbow: and the motion of the ankle and toes is slower, but more firm than that of the wrist and fingers.

1131. Description of Plate 1st of the Human Body.—In this representation the skin has been removed, shewing the parts as they lie beneath. 1, is the deltoides or large muscle of the shoulder, its principal use is to raise or draw the arm upwards; 2, 2, are called the pectoralis, they serve to raise the breast-bone and ribs in respiration; they also move the arm forwards to the breast-bone; 4, 4, 4, 4, is the serrated or saw-like muscle; 5, the large muscle of the belly; and 6, the linea-alba. 9, is the sartorius or taylor's muscle; it is so called as it is by its means they, in bending their knees draw their legs across each other. But the principal part of the plate to which I would direct your attention is 8: there you will perceive three cords as it were running down out of the belly on either side—it is called the spermatic cord. The spermatic cord on each side contains three tubes, viz. an *Artery* for carrying blood to the external parts of generation, a *vein* to return it; and the said tube which conveys the semen from the testicles to the vesicula semenalis or reservoir for prepared seed. It will also be easily understood by observing the manner in which the spermatic chord passes out through the walls or sides of the belly towards the testicles, how the bowels may readily be forced through the same opening, giving rise to that disease called rupture or *hernia*.

1132. Description of Plate 2nd of the Human Body.—Plate 2nd represents the chest with its contents removed, also the belly with its contents also removed, exposing to view only what lies immediately upon the back-bone. *m*, in the chest shews the ribs arising from the back-bone, the lungs and heart being removed. *a*, is the aorta or great blood-vessel of the body, just as it comes from the heart. *b*. is the diaphragm or great internal muscle of the chest. This muscle stretches quite across the chest, beneath the heart and lungs, forming a complete separation between them and the parts below. *d*, is an opening in it through which the tube from the mouth passes towards the stomach, which lyes just below it. *c*, is an opening through which the large *vein g* passes up towards the *heart*. *e*, is a kidney in its proper situation; and *i* is the other kidney split to shew its internal construction. *n*, *n*, are veins conveying returned blood from the kidneys to the large vein *g*, *to* be returned to the heart. *f*, *f*, are the ureters, one from each kidney, which receive the urine as it is separated from the blood in the kidneys, and conveys it downwards to the bladder as seen by following these tubes to their insertion into the back part of *l*, the urinary bladder. *j*, is the rectum or extremity of the bowels, and *k*, *k*, are large bundles of nerves passing downwards to the legs.

1132. DESCRIPTIONS OF THE FUNCTIONS, AND IMPORTANT OBSERVATIONS ON PLATE 1st and 2d.—In casting the eye over Plate 1st, the first thing that particularly strikes the eye, and to which I shall at once direct your attention, is the opening in each groin through which the *spermatic cord* is passing. To those afflicted with hernia, (rupture, a passing of the bowels through one or other of these openings,) this plate must be of much service, as it points out exactly where the sufferer should place the *ball* of the truss, or rupture belt, so as most effectually to retain the bowels in the abdomen after having been replaced. It also points out the situation where the rupture belt should be applied (where the disease is but a slight elevation and just beginning) so as to prevent its farther advancement. Before concluding my remarks on these important openings, I would with a conscientious regard to my afflicted fellow-mortal's welfare, recommend that in all cases of swellings in these situations, application should speedily be made to some regularly licensed medical practitioner for advice, and by all means to avoid impostures and *quacks*,—as a case very lately came under my notice, where an oldish man, a hard-working cotton-spinner, applied to me for advice respecting a tumour, in that situation, which *was rupture*. By applying a bandage with pressure over the elevated part, the increase of the disease was prevented: but when I relate to you the hair-breadth escape of this man from the hands of a *quack*, it will make you shudder. The old man, alarmed at the swelling in his groin, showed it to a fellow-workman, who advised him to make application to the *unlearned* and *unlicensed* person alluded to, who proposed immediately to open it, (so as to let out the matter which he supposed it contained,) but before proceeding to perform the operation, *he* must have *a guinea* in hand. The *old man* not having so much money about him, left the house to procure it, but having taken it into his head to call on me before he returned, the case ended as I have related. There can be no doubt, had the man had a guinea to have paid down, he instantly would have got his belly *ripped*; that is to say, had a lancet plunged into his bowels. The above is a sample of what may be expected at the hands of all impostures who dabble in medicine; their want of having been properly instructed, and their want of general medical experience and knowledge, allow them just to play at humbug on their own *hobby*. The Universal Vegetable Pill-man eternally cries, "purge away, all diseases originate in the bowels." The *worm-doctor* in every patient's face, sees some symptom of worms; they of course must be worm-powdered accordingly: while the above quack in every swelling sees only a collection of infectious matter. But enough for the present. If you bring your eye to the very bottom of the plate, *two* large blood-vessels will be seen passing out and downwards. It will be observed they lie very superficial, almost just below the skin; and when it is recollected that a wound of them is almost certain and immediate death, opening tumours in these situations require both knowledge and great caution; also persons using sharp instruments will do well to keep in mind the danger of a wound in this situation. In Plate 2nd, the first object that strikes the attention are the kidneys in their situation. One of them is divided so as to shew its internal structure, a funnel-like shaped tube is seen to descend from it towards the back part of the urinary bladder. This is called the ureter—it is marked *f* in the plate. You will observe it is much wider at top than at bottom. I wish you to pay particular regard to this, as I shall allude to it shortly. Seven small circles will be seen in the centre of the kidneys. These represent openings into the wide mouth of the *ureter;* it is by these openings the urine which is separated from the blood in the body of the kidney is conveyed into the ureter which is just a general canal to convey the urine collected from these several little mouths or openings into the general reservoir of the urine, the bladder.

Remark 1st. It is the kidney must be referred to for all anomalous symptoms of either quantity or quality of urine. Remark 2d. It is in the kidney and not in the bladder where those diseases, *stone* and *gravel* originate. Remark 3rd. It is in the ureter where what are called fits of the gravel are felt. Remark 4th. The kidneys are the principal emunctuaries by mean of which the impurities of the blood may be thrown off. Reasons for these remarks:—Reason for *first* remark—Because the urine is not prepared in either the bladder or ureters; it being only conveyed by the *one*, and retained by the other, till nature requires, and convenience offers a fit opportunity to get rid of it. In short, the *ureters* are but *canals*, and the bladder is but a containing vessel. CONCLUSION.—If the urine is wrong, the kidneys are at fault; as it is their office to distil, secrete, separate, or form it from the blood. Reason for *second* remark:—It is in the region of the kidneys alone where all persons affected with either complaint complain of weakness; and it is found what has been called *fits of the gravel*, (or those violent paroxisms of tearing pain which affect persons subject to either complaint) are always assigned to the situation of the kidneys, or ureters. Now let us take a look at the plate, and those terrible fits of excruciating pain will be easily accounted for. Just suppose, what does take place, that a small particle of sand has dropped from the body of the kidney into the ureter.—The consequence will be that its own specific gravity, and the downward current of urine will carry it towards the bladder till it is stopped by the narrowing of the tube. Now begins the pain: a hard body has got impacted into the small passage through which fluid only passed before. This creates spasm which induces sickness, even till vomiting is induced; and the consequent relaxation of the system allows a little respite from pain, till the hard substance drops a little farther down, and becomes fixed again; which fixing of the substance in descending, narrowing of the tube, and following violent fit of pain, with accompanying exhaustion and relaxation, continues to be repeated, till the stone, gravel, or hard body has passed through, and out of the small tube into the bladder, when the pain instantly ceases, excepting a dull, deep sensation of inward uneasiness felt along the course of the *ureter*, arising from the canal being hurt by the hard body passing down it. The above reasons apply also to remark *third.* Reasons for remark *fourth:*—When we reflect on the quantity of urine thrown off in twenty-four hours, we are at once led to enquire, Is this constant drain necessary, or is it a freak in nature? Common sense ought to teach, and does teach those who allow themselves to be taught by her, that urine, or what composes urine, are excrements most necessary to be expelled from the body by separation from the blood. So necessary has it been considered by the ARCHITECT OF NATURE, that the cleansing of the blood should go on incessantly for the well-being of the animal economy, that provision has been made for the constant eleminating from the blood of the body, its impurities: and it is worthy of notice, that the bladder is that *provision of nature* whereby this excrement is allowed a continual drain (into it) from the body, for there is a continual separation of it from the blood, it is continually flowing from the kidneys along the ureters to be deposited in its receptacle the bladder.

To be concluded in our next.

NOTICE TO CORRESPONDENTS.—" X. Y. a constant reader," shall have a letter by post, " A Student,"—his recommendation will be attended to in arranging the contents. " V's" request cannot be complied with. No. 35 to be published next Saturday will commence a new and simple system of Short-Hand. " A Friend " is informed that I will take the matter quite cooly, it is merely the rage of a *disappointed Quack desperado*, who has defaced the Experimentalist bills, and not the public,—the remedy referred to is therefore uncalled for. " A Medical Student " will find the information he requires, with respect to the " Method of preserving dead bodies for the dissecting room " at article 1053, p. 279. " Phantasmagoria " will have his requests fully satisfied in the course of a few numbers—as immediately after the " New System of Short-Hand has been completed, the illusions of " Frankenstein " will be unfolded in a series of articles on the Magic Lanthern.,—cuts in illustration of the subject being now in the hands of the engravaver.

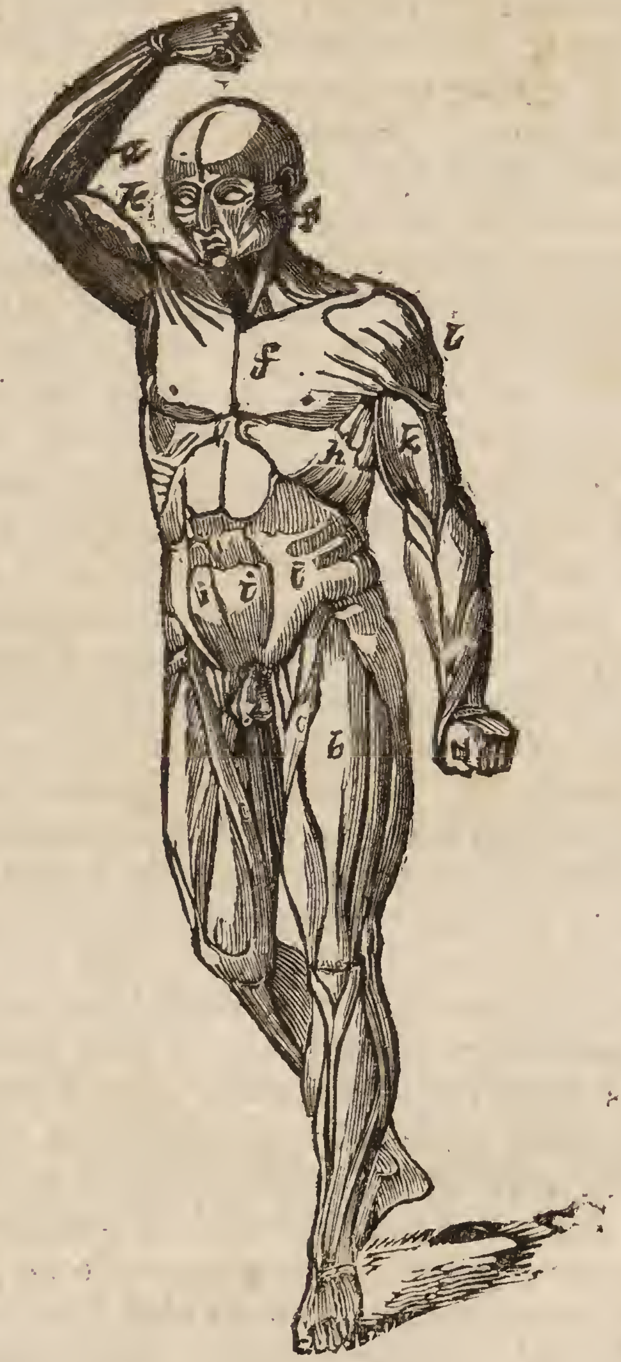
CALDWELL & SON, PRINTERS.

Stuart's Useful Information for the People,

Being No. 35 of the

CHEMICAL EXPERIMENTALIST.

1133. FRONT VIEW OF THE HUMAN MUSCLES.



a. The muscles of the fore-arm, by the contraction of which the fingers are moved.
b. The *rectus*, or straight muscle of the thigh.
c. The *sartorius*, or tailor's muscle.
f, *g*. A muscle called the sterno-cleido-mastoid muscle, employed in turning the head.
h. Muscles which raise and depress the ribs in breathing.
i, *i*, *i*. Muscles which compress and guard the bowels, and assist the actions of breathing.
k, *k*. The *biceps* muscle, which raises the fore-arm and hand.
l, *l*. The *deltoid* muscle, which protects the shoulder, and is chiefly employed when the arm is raised upwards and outwards.

1134. CONTINUATION OF ARTICLE 1132.—Oh! the hollow humbug and rascality of the Vegetable Pill villains, who assert it is by means of emptying the bowels they can purify the blood; and oh! how degraded must that mind be which cannot detect the gross nature of the quackish supposition,—that by means of purging the bowels you shall purify the blood. They who give such reason, and also those who receive it, are, and can only be blest, with the lowest scale of intellectual judgement. The impurities of man's body and blood carried off by purging the aliment out of the bowels!—Arrant fudge! Were it not to witness the degraded state of mind in *both* the giver and receiver of such *nonsense,* I would have an out-and-out *laugh.* Oh! debased must the blockheads be, who presume to attempt to inflict such stuff upon our understandings as having any support from those laws which regulate the animal economy. The use of the bowels is to contain the substances properly called food, till the drawers in of the nourishing part (viz. what are called the lacteals) have extracted, or sucked up all that which they require; when the remainder, the refuse, which was not fit for being sucked up, and converted into blood, is refused by them, and is therefore left to pass, or be thrown off from the body as excrement or fæces:—CALL THAT the impurities of the blood!—Oh! the cool-blooded, sly villains—it would be well for them I could call them idiots! Their purging stuff, and our purging stuff, and all purging stuff, carry not one atom of impurity from the blood. What is taken up by the absorbents of the bowels is carried into the blood; but what passes through the body from the mouth by the *anus* is waste, and has nothing whatever to do with the purifying of the blood (never having been in it) any more than the rapid emptying of its coke from a gas retort can have in purifying the gas in the gasometer. I ask, what means does nature take to separate impurities from the blood? Nature answers, "By sweat—by urine—by the incessant vapour from the lungs!" Oh! that the infidelity of man to the clear revelations of nature's operations in his own body were removed! Oh! that man were a more sound free-thinking, and less an ignorant, credulous, *duping* and *duped* fool. "The schoolmaster is abroad."—"This is the age of reason." Fudge! This is EIGHTEEN HUNDRED AND THIRTY-SEVEN. Oh! what an age of gulls, gulled by as regular a set of *out-and-out gulls* of *gullers* as ever gulled poor debased mortals, having the innate power to think and act correctly, *if they would.* They say man's blood is to be purified by purging.—To be purified by purging!—Forsooth! by carrying away *all that* from which *only* good blood can be obtained, viz. *the aliment.* Such reason is so far beneath reason, that I am now sick-tired descanting on this absurd stride of the "march of intellect," in this age of the world, so often dinned in our ears as excelling *all former times* in general and useful knowledge; In short, with all this age's boasted acquirements, I yet see little else than a great and predominating mass of ignorance and humbug.

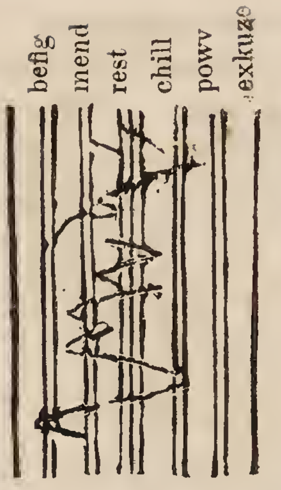
1135. Economy in Linen-washing.—A correspondent of the Dundee paper writes as follows:—After many experiments made by myself and others, I find that a little *pipeclay*, dissolved among the water employed in washing, gives the dirtiest linens the appearance of having been bleached, and cleans them thoroughly with about half the labour, and full a saving of one-fourth the soap. The method adopted was to dissolve a little of the pipeclay among the warm water in the washing tub, or to rub a little of it together with the soap on the articles to be washed. This process was repeated as often as required, until the articles to be washed were made thoroughly clean. All who have made the experiment have agreed that the saving of soap and labour are great; and that the clothes are improved in colour equally as if they were bleached. The peculiar advantage of employing this article with the soap is, that it gives the hardest water almost the softness of rain water.

1136. Distance of the Earth.—It is calculated that the earth is *two million seven hundred and fifty-four thousand miles* nearer to the sun in the shortest day than in the longest.

1137. THE ASBESTOS.—The asbestos is a stone found in different parts of Europe, which when beat into filaments, may be spun into thread, by mixing with it a small proportion of flax or cotton. When woven into cloth, it was employed by the ancients to enwrap their dead for the funeral pile, as this incombustible shroud preserved the ashes unmixed. In modern times, the Chinese use it for crucibles in many chemical processes.

1138. New Method of Writing Short-Hand—*By the Editor of the Cornucopia.*—General Observations.—The vowels are not used in writing Short-hand, by this method, or any other with which we are acquainted,—but the consonants only, for the sake of brevity. The omission of the vowels is at first rather puzzling, but the learner soon becomes familiar with it, both in writing and reading. Thus, the consonants *nd,* when written, can only represent the word *and* or *end;* and their position in the sentence in which they occur, together with the sense of the passage, at once indicates which of the two words is the right one. In the same way, *hnd* can only stand for *hand* or *hind,—bst,* for *best* or *bust, &c. frth* for froth, fourth, forth, or firth, &c. The sense of the speech or other matter taken in short-hand, remains, of course, on the mind of the short-hand writer, which greatly assists him in deciphering his own characters.

Developement of this New Method.—By this new method of writing short-hand, instead of using arbitrary characters to represent the consonants, the consonants are represented by the *lines*, and by the *wide spaces* between the lines, as in the engraving in next page.



Thus, the first line on the left denotes *b* ;—the wide space between the first and second lines denotes *f* ;—the second line denotes *g* ;—the *narrow* space denotes nothing, but is only, like all the other narrow spaces, for the purpose of separation ;—the third line denotes *m* ;—the wide space after it denotes *n* ;—the fourth line denotes *d* ;—the fifth line denotes *r* ;—the wide space *s* ;—the sixth line *t* ;—the seventh line denotes the pronoun *I*, and shows the centre, and assists the eye in finding the other places; the eighth line denotes *c* ;—the wide space, *h* ;—the ninth line, *l* ;—the tenth line, *p* ;—the wide space, *w* ; the eleventh line, *v* ; the twelfth line, *x* ;—the wide space, both *q*, and *k*, as their sound is the same ;—the last line denotes *z* ;—and the *outside* of the last or right hand denotes *y*; and the outside of the first or left hand line, denotes *j*.

In order to write, by this method, any consonant, it is only necessary, therefore, to place the pen or pencil upon that line or space by which the consonant required is denoted; and in order to connect it with another consonant, it is only necessary to draw a line faom the place denoting the one consonant to the place denoting the other, as is exemplified in the engraving.

The first word written in the engraving is *the*,—which of course must be represented by *th* only, as the vowels are omitted; and, in order to write these two letters, the pen was put down on the sixth line, which is the place of *t*, and was drawn *downwards* to the middle of the space between the eighth and ninth lines, which is the place of *h*,—thus by this simple stroke distinctly denoting both of these letters, *th*, and consequently the word, *the*.

The second word is *art*, represented by *rt* only; and the pen was consequently put down on the fifth line, which is the place of *r*, and was drawn downwards to the sixth line which is the place of *t*,—making *rt*, for *art*.

The third word is *of*, represented by *f* only; and the pen consequently made a dot only in the first wide space, which is the place of *f*.

The fourth word is *writing,* represented by *wrtng* only; and the pen, consequently, was put down in the fifth wide space, which is the place of *w,* and was drawn downwards to the fifth line, which is the place of *r,*—then back to the sixth line, which is the place of *t,*—then forward again to the middle of the second wide space, which is the place of *n,*—and then to the second line, which is the place of *g,*—making *wrtng* for *writing.*

The fifth word is *short,* represented by *shrt;* and the pen was therefore put down in the middle of the third wide space, which is the place of *s,*—was drawn to the middle of the fourth wide space, which is the place of *h,*—then to the fifth line, which is the place of *r,*—and then to the sixth line, which is the place of *t,*—making *shrt* for *short.*

The sixth word is *hand,* represented by *hnd;* and the pen, of course, was put down in the middle of the fourth wide space, which is the space of *h,*—and was then drawn to the middle of the second wide space, which is the place of *n,*—and then to the fourth line, which is the place of *d,*—making *hnd,* for *hand.*

The seventh word is *simplified,* represented by *smplfd;* and the pen was therefore put down in the middle of the third wide space, which is the place of *s,*—and was then drawn to the third line, which is the place of *m,*—then to the tenth line, which is the place of *p,*—then to the ninth line, which is the place of *l,*—then to the middle of the first wide space, which is the place of *f,*—and then to the fourth line, which is the place of *d,*—making *smplfd* for *simplified.*

All the words in the engraving, as written and read downward from the top of the columns, are,

The art of writing short-hand simplified.
Th rt f wrtng shrt-hnd smplfd.

The stroke must always proceed downward, in order to show which is the *beginning* of each word. If the stroke for *th,* for example, had been carried upward, it would have denoted *ht,*—and the word must have been *hat* or *hit,* &c. instead of *the;* and if the stroke had been drawn right across, it would have been *doubtful* whether it represented *th* or *ht.*

When the pen is drawn in a strait line from one place to anothe, as from the place of *w* to the place of *r,* in the word *writing,* all the lines over which it passes, in its course, indicate nothing. Nothing is ever indicated, except by the place from which a stroke commences, and the place at which it ends.

Directions for Writing by this Method.—The learner is requested to get by heart the words, or rather sounds, *befig, mend, rest,*—*chill, powv, exkuze,* because as soon as he has committed these to memory, he will readily find the places of all the consonants, or of any of them. For,

By calling the first two lines and the space between them by the name of *befig,* it is indicated that the first line is *b,* that the space is *f*, and that the second line is *g*, for the vowel *e* in the name goes for nothing, the vowels not being used.

By calling the third and fourth lines, with the space between them, *mend*, it is indicated that the third line is *m*, that the space is *n*, and that the fourth line is *d*,—the vowel *e* in the name *mend* again going for nothing, as no vowels are used in short-hand.

By calling the fifth and sixth lines, with the space between them, by the name of *rest*, it is indicated that the fifth line is *r*, that the space is *s*, and that the sixth line is *t*.

By calling the eighth and nine lines, with the space between them, by the name of *chill*, it is indicated that the eighth line is *c*, that the space is *h*, and that the ninth line is *l*.

By calling the tenth and eleventh lines and the space between them by the name of *powv*, it is indicated that the tenth line is *p*, that the space is *w*, and that the eleventh line is *v*.

By calling the twelfth and the thirteenth or last lines, with the space between them, by the name of e*xk*u*z*e, it is indicated that the twelvth line is *x*, that the space is *k*, or *q*, and that the last line is *z*.

Having learnt, therefore, these few words by heart, viz. *befig*, *mend*, *rest*,—*chill*, *powv*, *exkuze*, and remembering that the place of *y* is on the outside of the last line, and that the place of *j* is on the outside of the first line, the learner may immediately begin to write.—

To be continued.

1139. THE FROG WEATHER GLASS.—In Germany there are now to be found in many country houses, an amusing application of zoological knowledge for the purpose of prognosticating the weather. Two frogs are kept in a glass jar about 18 inches in height, and 6 inches in diameter, with the depth of 3 or 4 inches of water at the bottom, and a small ladder reaching to the top of the jar. On the approach of dry weather the frogs mount the ladder; but when wet weather is expected, they descend into the water. These animals are of a bright green.

1140. FRAUD DETECTED.—It is well known that but little genuine honey can be obtained. The tests of good honey are its fragrance and sweetness. When it is suspected to be adulterated with flour, the fraud may be discovered by dissolving the honey in luke-warm water, when the flour will be readily seen, as it will not dissolve.

1141. CURIOUS PHILOSOPHICAL PHENOMENON.—In the last number of *Siliman's Journal*, in an article on "Currents in Water," it is asserted that if a tub or other vessel is filled with water, and a hole made near the middle of the bottom of it to discharge it, the water will acquire a rotatory motion from west to south, or opposed to the apparent motion of the sun; and if means are used to produce an opposite motion, upon withdrawing those means the former direction will be resumed. This cannot be the effect of chance, but of natural laws constantly operating.

1142. VOLCANOES IN THE MOON.—Sir William Herschel, in 1787, observed three volcanoes in the moon, one of which he says was an actual eruption of fire or luminous matter. Captain Kater remarked, on the 4th of February, 1821, a luminous appearance in the dark part of the moon, which is believed to be identical with the lunar mountain called Aristarchus. This volcano, as observed by Captain Kater, appeared like a small nebula, subtending an angle of about three or four seconds. Its brightness was very variable; a luminous point, like a small star of the sixth or seventh magnitude, would suddenly appear in its centre, and as suddenly disappear, and these changes would sometimes take place in the course of a few seconds. On the evening of the fifth of the same month, the same phenomena were observed as before, only in an inferior degree. It had become more faint on the 6th, and the star-like appearance less frequent, and the 7th it was scarcely visible. The existence of volcanoes in the moon must therefore be considered as fairly established by observation. Independently of these observed facts, analogy would lead us to expect that the same laws which are found to regulate the internal constitution of the earth should also prevail in the other heavenly bodies.

1143. ELECTRICAL SHOCK FROM A SHEET OF PAPER.—Place an iron japanned tea-tray on a dry, clean, beaker-glass; then take a sheet of foolscap writing paper, and hold it close to the fire until all its hygrometric moisture is dissipated, but not so as to scorch it; in this state it is one of the finest electrics we have. Hold one end down on a table with the finger and thumb, and give it about a dozen strokes with a large piece of Indian rubber from the left to the right, beginning at the top. Now take it up by two of the corners, and bring it over the tray, and it will fall down on it like a stone; if one finger be now brought under the tray, a sensible shock will be felt. Now lay a needle on the tray with its point projecting outwards, remove the paper, and a star sign of the negative electricity will be seen; return the paper, and the positive brush will appear. In fact, it forms a very good extemporaneous electrophorus, which will give a spark an inch long, and strong enough to set fire to some combustible bodies, and to exhibit all the electric phenomena not requiring coated surfaces. If four beaker glasses are placed on the floor, and a book laid on them, a person may stand on them insulated; if he then holds the tray vertically, the paper will adhere strongly to it, and sparks may be drawn from any part of his body, or he may draw sparks from any other person, as the case may be; or he may set fire to some inflammable bodies by touching them with a piece of ice.—*Mechanic's Magazine.*

1144. **TOOTH POWDER.**—Take half an ounce of powdered gum myrrh, one ounce of powdered bark, two drachms of cream of tartar, one drachm of bole ammoniac, mix in a mortar. A constant use of this powder will cause the teeth to obtain a beautiful whiteness, preserve them from decaying, and prevent the tooth-ache. As some persons prefer using a tooth-paste in preference to a powder, the above mixture need only be made into a paste with the addition of honey.

1145. **SALTS OF LEMONS.**—Take equal parts of cream of tartar and citric acid powdered very fine, and mix together. This forms the salts of lemons as sold at the druggists' shops in small oval boxes at 1s. each, printed directions for using, which may be had of any druggist.

1146. **MATCHLESS BLACKING.**—Take a quarter of a pound of ivory black, two ounces of the coarsest brown sugar, three pints of sour table beer, mix it well together, then throw in about a small table spoonful of sweet oil, and as much vitriolic acid; stir it well together, and in a few hours bottle it for use.

1147. **Bailey's Patent Cakes for Liquid Blacking.**—This blacking has been the source of an ample fortune to the patentee, the celebrated Mr. Bailey, of Cockspur street, Charing Cross, whose exclusive right has lately expired. It is made, according to the specification in the patent office, with one part of the gummous juice which issues from the shrub called goat's thorn, during the months of June, July, and August; four parts of river water, two parts of neat's foot or some other softening oil, two parts of a deep blue colour, prepared from iron and copper, and four parts of brown sugar-candy. The water is then evaporated till the composition becomes of a proper consistence, when it is formed into cakes of such a size as to produce, when dissolved in hot water, a pint of liquid blacking.

1148. **German Method of Blacking Leather.**—Take two pounds of the bark of elder, and the same quantity of the filings of the rust of iron; steep them in two gallons of river water, and put them in a cask or earthen vessel closely stopped. After it has stood two months, put to the liquid when well pressed out, a pound of powdered nut-galls, and a quarter of a pound of copperas; then, after stirring it over a good fire, press out the liquid, with which the leather is to be three or four times brushed over, when it becomes of an excellent and most durable black.

Notice to Correspondents in our next.

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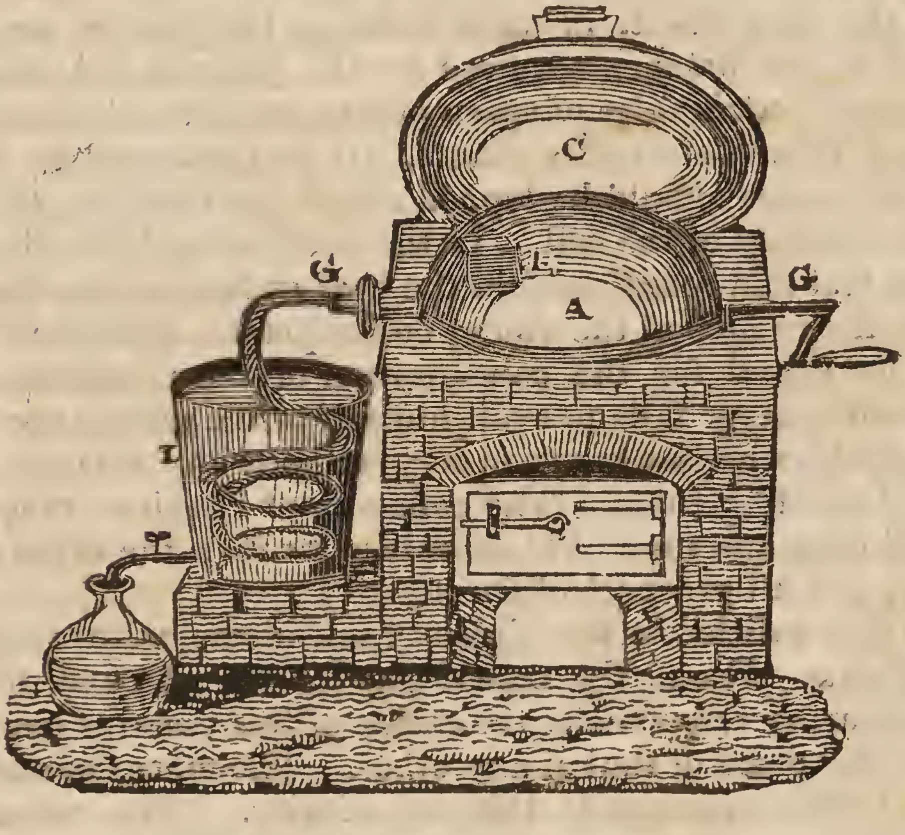
1149. COFFEE ROASTING APPARATUS.



1150. Description of the Coffee Roasting Apparatus.—A is an egg-shaped coffee-roaster, into which the coffee is put in order to be submitted to the process of roasting over the furnace: it is necessary that this part of the apparatus should be easily removed out of its place, and replaced again, so as to facilitate the getting the roasted coffee out when properly done. E is an opening to put the coffee in by, and also to ascertain how the process is getting on. C is a cover to secure the whole. L is a worm to condense the vapour; and G G is an axle and winch to turn the receiver by.

1151. THE COFFEE TREE.—All land within the extent of five degrees crossed by the line is suitable for the cultivation of coffee, excepting land composed of hard and cold clay, or light and sandy ground on a bed of marl. It requires, in preference, a soil new and free, where the coolness and the rains moderate the excessive heat of the torrid zone, which would overpower the plant if exposed to all its violence.

The eastern coffee-tree seldom rises more than sixteen or eighteen feet high, in its native country; the main stem grows upright, and is covered with a light brown bark; branches horizontal, and inclined to bend downwards; the lower ones longest, the others gradually decreasing to the top, so as to form a pyramid. The leaves generally continue three years. The flowers are produced in clusters at the base of the leaves, sitting close to the branches; they are of a pure white, with a very grateful odour, but of short duration, and are succeeded by berries, which are first green, but turn red when fully grown. and change to black when ripe.

The land destined for the coffee being well cleared, holes are made for the new plant, in such order as the planter may think proper, and at the distance required by the ground. A square of ground planted in triangles of seven plants, gives two thousand nine hundred and twenty-six coffee plants. It is important to fruitfulness that the plants should be lopped off at a certain height, regulated by the quality of the soil. In the poorest land they are trimmed at two feet and a half, and in the best at four or five feet high.

Between the ranges of the young coffee-plants, sufficient vegetables may be raised for the consumption of the plantation. The prudent planter never fails to avail himself of the advantage of having all vegetables he has occasion for, without any further trouble than that of planting them. The coffee-plant requires much rain, excepting during the time of blossoming, for then the rains destroy the flowers, and all prospect of fruit.

The country entitled to the highest rank in the culture of coffee is Arabia Felix. From the superiority of the method observed there in preparing this article, the coffee of this country commands three times the price of that of any other. The mere denomination of Mocha Coffee commands this superiority. The preparation which it receives exacts cares too minute and tedious to be entirely suitable to considerable plantations; but they are not, therefore, the less necessary to be known, that the principles may be adopted on which they are founded, and that they may be observed as far as localities will permit.

The plantations are in moist shady situations, on small eminences at the foot of the mountains, whence little rills of water are conducted in small channels to the roots of the trees, to secure the production and ripening of the fruit. When the fruit is nearly ripe the water is turned off, lest the fruit should be too succulent. In places much exposed to the south the coffee-trees are planted in regular lines, sheltered by a kind of poplar tree, which affords a thick shade. Without this precaution the blossoms would be so parched by the excessive heat of the sun, as not to be succeeded by fruit.

"When the Arabian cultivator, (says Mr. Bryan Edwards) sees that his coffee is ripe, he spreads large cloths over the trees, which he shakes from time to time to make the ripe cherries fall. He never pulls one grain of coffee with the hand, whatever appearance it may have of maturity: he considers none as ripe but such as fall on lightly shaking the tree. This process, more or less rigorously observed, serves at least to confirm the principle, that perfect maturity is an essential requisite for obtaining good coffee.

The grains thus gathered are exposed to the sun on mats with their pulps, until they are perfectly dry; which requires a long time. Their dry envelope is then removed by means of a large stone cylinder, and they are replaced in the sun; for the planters of Yemen are persuaded that the coffee is apt to ferment, as long as it retains any particle of humidity. It is then winnowed, and packed in bales for merchandise. This practice indicates that the coffee can never be too dry.

The coffee-tree bears flowers only the second year, and its flowering lasts only twenty-four hours. At this time the shrub has a charming aspect; seen from afar, it appears covered with snow. The produce of the third year becomes very abundant. In plantations well weeded and watered, and recently cultivated, we find trees bearing sixteen, eighteen, and even twenty pounds of coffee. In general, however, a produce of more than a pound and a half, or two pounds, cannot be expected from each plant.

The liquor which we call coffee, prepared from the berry of this tree, is said to have been drunk in Ethiopia from time immemorial.

Two English travellers notice this beverage at the beginning of the seventeenth century; Biddulph, about 1603, and William Finch, in 1607. The former says, "The Turks have, for their most common drink, coffa, which is a black kind of drink, made of a kind of pulse like pease, called *coava*." The latter, that "The people in the island of Socotora have, for their best entertainment, a china dish of *coho*, a black bitterish drink, made of a berry like a bay-berry, brought from Mecca, supped off hot."

The first plant which appeared in Jamaica was carried there in 1720, and in the year 1752, the export of coffee from Jamaica was rated at 60,000 pounds weight. The Abbé Raynal says, that 12,550,000 pounds weight is annually exported from Arabia Felix. In Jamaica, the coffee-tree thrives best in a rich soil, and cool shaded situation, where it produces so great a quantity of fruit that the branches can hardly sustain the weight, and even the very trunk yields to the load.

The honour of introducing tea has been disputed between the English and the Dutch, while that of coffee remains between the English and the French.

It appears by Le Gran's "Vie privée des François," that the celebrated Thevenot, in 1658, gave coffee after dinner; but it was considered as the whim of a traveller. It was attributed, by the gay, to the humour of a vain philosophical traveller. We, however, knew its use even before the time of Thevenot; for an English Turkish-merchant brought a Greek servant in 1652, who, knowing how to roast and make it, opened a house to sell it publicly. The hand-bill has been discovered, in which he sets forth, "The vertue of the coffee-drink, first publiquely made and sold in England, by Pasqua Rosee, in St. Michael's Alley, Cornhill, at the sign of his own head."

The following quaint old reprint from "The Coffee-drinker's Manual," is worthy of a place:—

"The quality of this drink is cold and dry; and though it be a drier, yet it neither *heats* nor *inflames* more than *hot posset*.

"It so closeth the orifice of the stomach, and fortifies the heat within, that its very good to help digestion; and therefore of great use to be taken about three or four o'clock afternoon, as well as in the morning.

"It much quickens the *spirits*, and makes the heart *lightsome*.

"It is good against sore eyes, and the better if you hold your head over it, and take in the steam that way.

"It suppresseth fumes exceedingly, and, therefore, good against the *head-ache;* and will very much stop any *defluxion of rheums* that distil from the *head* upon the *stomach;* and so prevent and help *consumptions*, and the *cough of the lungs*.

"It is excellent to prevent and cure the *dropsy*, *gout*, and *scurvy*.

"It is very good to prevent *miscarrying in child-bearing women*.

"It is a most excellent remedy against the *spleen*, *hypocondriac minds*, and the like.

"It will prevent *drowsiness*, and make one fit for business, if one have occasion to *watch;* and, therefore, you are not to drink of it *after supper*, unless you intend to be *watchful*, for it will hinder sleep for three or four hours."

1152. Of the Roasting of Coffee.—If coffee be underdone, it lies heavy on the stomach, and is without virtue; and if overdone, it turns sour, insipid, and has a disagreeable burnt flavour. So soon as it is roasted, it should be carefully covered, as without this precaution, it loses its strength, flavour, and fragrance—its most essential recommendations. As a general rule, unroasted coffee should in general be reduced in weight by roasting from 14 to 11 pounds. The berry should then have assumed a cinnamon colour.

1153. Rule for making good Coffee, after the French method.—To every pint of water, take 2½ oz. of coffee. Then take the boiling water off the fire, and add the coffee newly ground. Then cover it securely, and let it stand for two hours surrounded with hot cinders, so as to keep up the temperature of the liquid without making it boil. It should be repeatedly stirred during this digestion; when, after two hours infusion, the liquor should be removed from the fire, and allowed 15 minutes to settle: when quite cool, it should be carefully decanted.

1154. IMPROVED COFFEE POT.—Amongst the new Parisian inventions is a coffee-pot constructed of three pieces: the first is a plain boiler, over that is a double filter, and at the top is an inverted coffee-pot, which fits on exactly. Cold water is placed in the first vessel, and the coffee in the filtering box. Under the whole is a spirit lamp, which in the course of five or six minutes causes the water to boil, the vapour arising from which completely saturates the coffee. When the water boils, which is ascertained by the discharge of the vapour from the spout of the inverted coffee-pot, the whole machine is lifted from the lamp, and completely inverted; so that the pot which was uppermost, is at the bottom, and the boiling water, which had saturated the coffee, flows through the filterer clear, into what was before the inverted coffee-pot, where in the space of two minutes it is ready for use. This mode of preparing coffee is a saving of at least 25 per cent. and it secures the fine flavour of the berry. In another part of the service is a coffee-roaster, of glass, over another lamp of a long wide flame. The roasting require about three minutes, and even so small a quantity as an ounce may be thus prepared.

1155. ANOTHER PARISIAN METHOD OF MAKING COFFEE.—In the first place, let the coffee be of prime quality—grain small, round, hard, and clear; perfectly dry and sweet; and at least three years old—let it be gently roasted until it be of a light brown colour; avoid burning, for a single scorched grain will spoil a pound. Let this operation be performed at the moment the coffee is to be used; then grind it while it is yet warm, and take of the powder an ounce for each cup intended to be made; put this along with a small quantity of shredded saffron, into the upper part of the machine, called a *grecque*, that is, a large coffee-pot, with an upper receptacle made to fit close into it, the bottom of which is perforated with small holes, and containing in its interior two moveable metal strainers, over the second of which the powder is to be placed, and immediately under the third; upon this upper strainer, pour boiling water and continue doing so gently until it bubbles up through the strainer; then shut the cover of the machine close down, place it near the fire, and so soon as the water has drained through the coffee, repeat the operation until the whole intended quantity be passed. Thus all the fragrance of its perfume will be retained, with all the balsamic and stimulating powers of its essence; and in a few moments will be obtained—without the aid of hartshorn shavshavings, isinglass, whites of eggs, or any of the trash with which, in the common mode of preparation, it is mixed—a beverage for the gods. This is the true Parisian mode of preparing coffee;—the invention of it is due to M. de Belloy, nephew to the Cardinal of the same name.

1156. COFFEE MILK.—Boil a dessert-spoonful of ground coffee in about a pint of milk, a quarter of an hour; then put into it a shaving or two of isinglass, and clear it: let it boil a few minutes, and set it on the side of the fire to fine. This is a very fine breakfast, and should be sweetened with real Lisbon sugar.

Those of a spare habit, and disposed towards affections of the lungs, would do well to make this their breakfast.

1157. TO MAKE COFFEE.—The best coffee is imported from Mocha. It is said to owe much of its superior quality to being kept long; attention to the following circumstances is likewise necessary. 1. The plant should be grown in a dry situation and climate. 2. The berries ought to be thoroughly ripe before they are gathered. 3. They ought to be well dried in the sun; and 4. Kept at a distance from any substance, (as spirits, spices, dried fish, &c.) by which the taste and flavour of the berry may be injured.

To drink coffee *in perfection*, it should be made from the best Mocha berries, carefully roasted, and after cooling for a few minutes, reduced to powder, and immediately infused; the tincture will then be of a superior description. But for common use, the coffee of our own plantation is, in general, of very good quality, and the following mode of preparing it may be adopted:—

1. The berries should be carefully roasted, by a gradual application of heat, scorching, but not burning them.

2. Grinding the coffee has been found preferable to pounding, because the latter process is thought to press out, and leave on the sides of the mortar, some of the rich oily substances, which are not lost by grinding.

3. A filtrating tin, or silver pot, with double sides, between which hot water must be poured, to prevent the coffee from cooling, as practised in Germany, is the best machine to be used. Simple infusion in this implement, with boiling water, is all that is required to make a cup of good coffee; and the use of isinglass, the white of eggs, &c. to fine the liquor, is quite unnecessary. By this means, also, coffee is made quicker than tea.

In England, too little powder of the berry is commonly given. It requires about one small cup of coffee-powder to make four cups of tincture for the table. This is at the rate of an ounce of good powder to four common coffee-cups. When the powder is put in the bag, as many cups of boiling water is poured over it as may be wanted, and if the quantity wanted is very small, so that after it is filtrated it does not reach the lower end of the bag, the liquor must be poured back three or four times, till it has acquired the necessary strength.

By following these plain directions, it is to be hoped that a wholesome and valuable production of our own colonies will come into more general use; and that foreigners will no longer have any ground to assert, that they very rarely meet with a cup of tolerable coffee in England.

1158. Another Method of Making Coffee.—Pour a pint of boiling water on an ounce of coffee; let it boil five or six minutes, then pour out a cupful two or three times, and return it again; put two or three isinglass chips into it, or a lump or two of fine sugar; boil it five minutes longer; set the pot by the fire to keep hot for ten minutes, and the coffee will be beautifully clear. Some like a small bit of vanilla. Cream should always be served with coffee, and either pounded sugar-candy, or fine Lisbon sugar. For foreigners, or those who like it extremely strong, make only eight dishes from three ounces. If not fresh roasted, lay it before a fire till hot and dry; or put the smallest bit of fresh butter into a preserving pan, when hot throw the coffee into it, and toss it about till it be freshened.

Coffee most certainly promotes watchfulness; or, in other words, it suspends the inclination to sleep. To those, therefore, who wish not to be subject to this inclination, coffee is undoubtedly preferable to wine, after dinner, or perhaps to any other liquor.

Were coffee substituted instead of wine immediately after dinner, it seems more than propable that many advantages would flow from it, both to the health of individuals, and general economy; and it seems not improbable that by deferring coffee, or tea, so late as is practised, we interrupt digestion, and add a new load of matter to that already in the stomach, which, after a full meal, is not a matter of indifference. Persons afflicted with asthma have found great relief and even a cure, by drinking very strong coffee, and those of a phlegmatic habit would do well to take it for breakfast. It is rather of a drying nature, and with corpulent habits it would also be advisable to take it for breakfast.

1159. Arabian Method of preparing Coffee.—The Arabians, when they take their coffee off the fire, immediately wrap the vessel in a wet cloth, which fines the liquor instantly, makes it cream at the top, and occasions a more pungent steam, which they take great pleasure in snuffing up as the coffee is pouring into the cups. They, like all other nations of the East, drink their coffee without sugar.

People of the first fashion use nothing but Sultana coffee, which is prepared in the following manner. Bruise the outward husk, or dried pulp, and put it into an iron or earthen pan, which is placed upon a charcoal fire; then keep stirring it to and fro until it becomes a little brown, but not of so deep a colour as common coffee; then throw it into boiling water, adding at least the fourth part of the inward husks, which is then boiled altogether in the manner of other coffee. The husks must be kept in a very dry place, and packed up very close, for the least humidity spoils the flavour. The liquor prepared in this manner is esteemed preferable to any other. The French, when they were at the court of the king of Yemen, saw no other coffee drank, and they found the flavour of it very delicate and agreeable; there was no occasion to use sugar, as it had no bitter taste to correct.

In all probability the Sultana coffee can only be made where the tree grows; for as the husks have little substance, if they are too much dried, in order to send them to other countries, the agreeable flavour they had when fresh, is greatly impaired.

1160. IMPROVEMENT IN MAKING COFFEE.—The process consists in simmering over a small but steady flame of a lamp. To accomplish this, a vessel of peculiar construction is requisite.—It should be a straight-sided pot, as wide at top as at bottom, and inclosed in a case of similar shape; to which it must be soldered air tight at the top. The case to be above an inch wider than the pot, and descending somewhat less than an inch below it. It should be entirely open at the bottom, thus admitting and confining a body of hot air round and underneath the pot. The lid to be double, and the vessel, of course, furnished with a convenient handle and spout. The extract may be made either with hot water or cold. If wanted for speedy use, hot water, not actually boiling, will be proper, and the powdered coffee being added, close the lid tight, stop the spout with a cork, and place the vessel over the lamp. It will soon begin to simmer, and may remain, unattended, till the coffee is wanted. It may then be strained through a bag of stout, close linen, which will transmit the liquid so perfectly clear as not to contain the smallest particle of the powder.

1161. COFFEE CREAM.—Boil a calf's foot in water till it wastes to a pint of jelly, clear of sediment and fat. Make a tea-cup full of very strong coffee; clear it with a bit of isinglass to be perfectly bright, pour it to the jelly, and add a pint of very good cream, and as much fine Lisbon sugar as is pleasant; give one boil up, and pour into the dish. It should jelly, but not be stiff.

1162. TO MAKE COFFEE.—Put two ounces of fresh ground coffee, of the best quality, into a coffee-pot, and pour eight coffee-cups of boiling water on it; let it boil six minutes, pour out a cupful two or three times, and return it again; then put two or three isinglass chips into it, and pour one large spoonful of boiling water on it; boil it five minutes more, and set the pot by the fire to keep hot for ten minutes, and you will have coffee of a beautiful clearness.

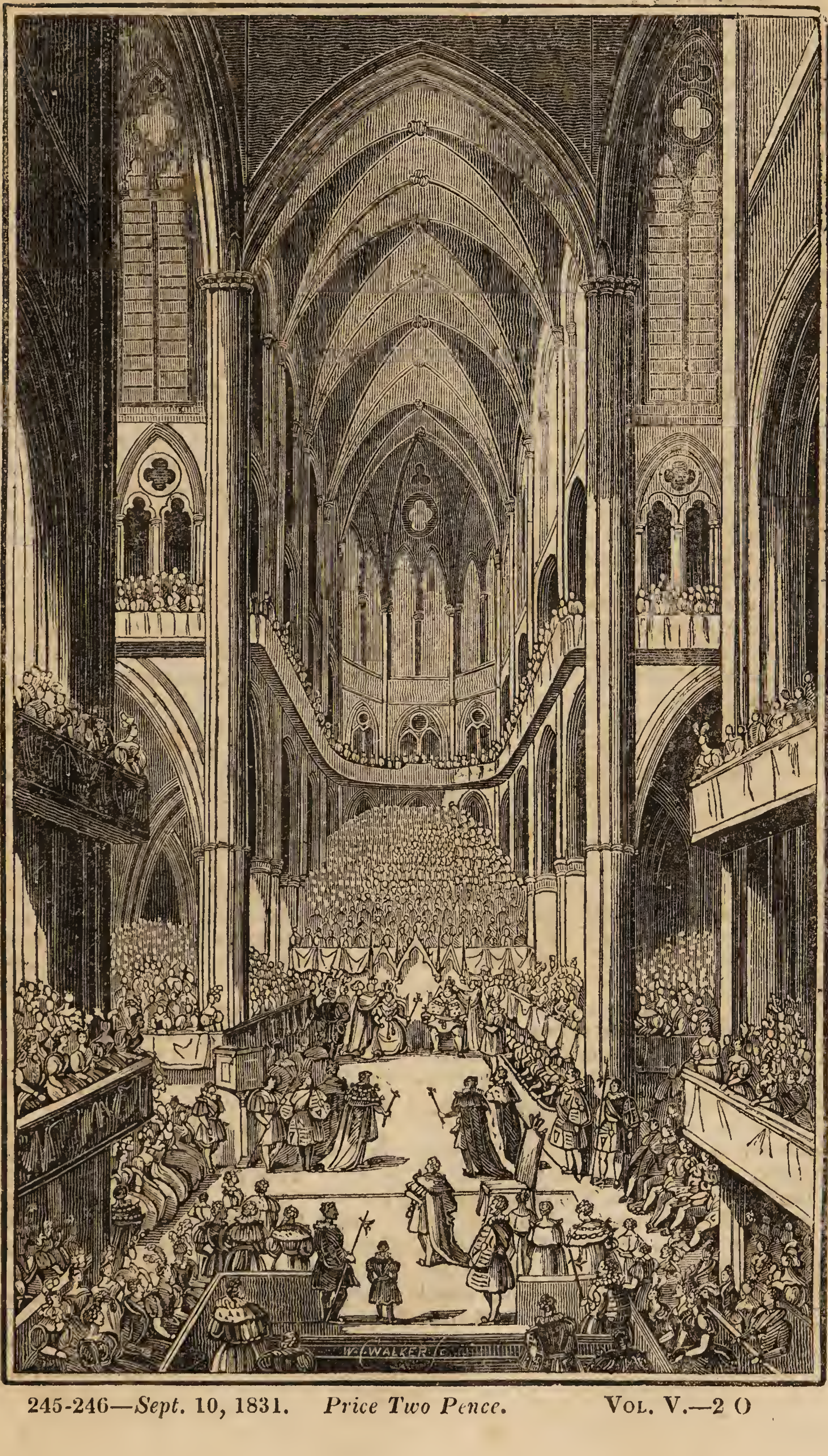
1163. BONAPARTE'S METHOD OF MAKING COFFEE.—Put the ground coffee into a vessel with a strainer, and pour the water on it perfectly cold; plunge this vessel into another filled with boiling water, which must be kept at the boiling pitch till the process is completed.

Subject Coffee to be continued.

CALDWELL & SON, PRINTERS.

The Casket,

OF LITERATURE, SCIENCE, AND ENTERTAINMENT.



245-246—*Sept.* 10, 1831. *Price Two Pence.* VOL. V.—2 O

CORONATION OF THEIR MOST GRACIOUS MAJESTIES WILLIAM THE FOURTH AND HIS CONSORT ADELAIDE.

The ceremony of crowning our kings is merely a solemn recognition and confirmation of the royal descent, and consequent right of accession, and is not necessary for the security of their title to the crown; it is, however, highly essential, inasmuch as it tends to a formal establishment of those rights which the people claim from the Monarch, in return for the duty and allegiance they are bound to observe towards the new sovereign.

On the joyous occasion of the Coronation of their present Majesties, which has taken place as appointed, on Thursday, the 8th of September, 1831, the editor of The Casket has the pleasure of presenting his readers with a double sheet, enriched with a series of engravings, which, for their number and accuracy, he trusts will be found to surpass all his competitors. The engravings of the regalia, the ancient chair, &c., are copied from the best sources; the views of the processions to and within Westminster Abbey, which occupy about 100 inches of minute and difficult engraving, are the first published views of those portions of the ceremony; while the fine engraving occupying our first page, though certainly not the first, possesses the greater merit of being the *only correct* representation of the coronation and of the arrangements within the Abbey yet before the public. It is engraved from drawings actually taken within the Abbey, expressly for this work, by an eminent artist; for permission to do which we are indebted to the courtesy and kindness of Colonel Sir C. B. Stephenson, to whom the whole arrangements were confided, and by whom they were carried into execution with the utmost taste and skill.

Finding it impossible to give the history of the regalia, &c., in this sheet, without suppressing some of the interesting details of the coronation itself, we are obliged to refer our readers to No. 247 of The Casket, which is now published, for a description of the subjects of our small engravings; and to proceed at once with our account of the arrangements made within and without the Abbey.

The great western entrance, our readers are aware, faces Tothill Street, and in front of it a small temporary Gothic Edifice, extremely neat, and appropriate in its structure, has been erected. The object of this was to afford accommodation for their Majesties on alighting from their carriages. It contains two temporary rooms—that on the right for the King and his attendants, and that on the left for her Majesty and her attendants. These are fitted up with great elegance, the walls papered with crimson damask paper, surmounted with gold mouldings; the ceiling of azure blue, with a gothic border, and the curtains and drapery to the latticed window of crimson silk. The furniture comprised the usual assortment in a small sitting-room—chairs, sofas, ottomans, and tables, and the *tout ensemble* was perfectly suited to the occasion. The waiting-rooms we have described open by folding-doors, covered with crimson cloth, into a lofty passage with gothic roof, apparently formed of gothic pannels, but which, in fact, is papered with a pattern of that description. This passage leads by a sort of curve to the great western door of the Abbey, or Nave, on reaching which the matchless *coup d'œil* of the interior of the edifice bursts upon the eye. Each side of the Nave is fitted up with boxes which were filled with elegantly dressed spectators, and the vaultings above have galleries protruding from them, which were similarly occupied; they are all covered with crimson cloth. Similar galleries extend throughout the whole of the vaultings of the Abbey—a vast improvement on the late Coronation, when the galleries were omitted.

On the floor of the Nave a platform is erected, for the procession to pass along. This is covered with purple cloth.

The Interior of the Abbey.—We have already stated that galleries advance from all the vaultings or nunneries. Those within the Choir were appropriated to persons to whom tickets were issued from the Earl Marshal's Office. Those without are private property, and were devoted to persons paying for their admission.

On approaching the choir from the nave, the first object that presents itself is a beautiful Gothic Screen, which encloses the organ and organ-loft, where the musicians, under the direction of Sir George Smart, were stationed. This screen has all the appearance of solid masonry, and has been painted by Mr. Paris, the celebrated painter of the Colosseum, with exquisite taste: on the one side is a full-length figure of Henry the Third; and on the other, a figure of Edward the Confessor, with appropriate shields. This Screen operated as a sort of sounding-board to the music, and assisted in confining the sound within the choir.

Within the choir, the floor covered with purple cloth, enclosed ranges of seats appear on each side, which were occupied by the Great Officers of State and the Household. In advance is seen 'The Theatre,' which stands between the Transepts, and in this are raised two platforms, one ascended by five steps, and the other by three; on these are placed the Chairs of State, or Thrones, for the King and Queen—the King's on the higher, and the Queen's on the lower, to the left. These platforms, to the base of the first step, are covered with cloth of gold, and from thence to the flooring of the Theatre with rich Wilton carpet. The Theatre is approached by several steps from the Choir.

At the Sacrarium in front of the Altar, the Coronation Chairs were placed, beautifully renovated and prepared for the occasion. On the right, looking to the Altar, is the box for the Princesses of the Royal family, and on the left, a bench for the Bishops. The Altar itself is surrounded by a beautiful Gothic gilt frame, the back being covered with purple and gold silk. The Sacrarium on the left, as well as the back on each side the Altar, is hung with Coronation damask. The box for the Princesses is lined with crimson sarsenet, and the front hung with crimson damask, while the top is decorated with a Gothic gilt cornice, the whole having a chaste and very elegant effect. The Altar Table and Offering Table, with their pillows, are covered with purple and gold silk. The floor of the Sacrarium is covered with a rich purple and gold carpet.

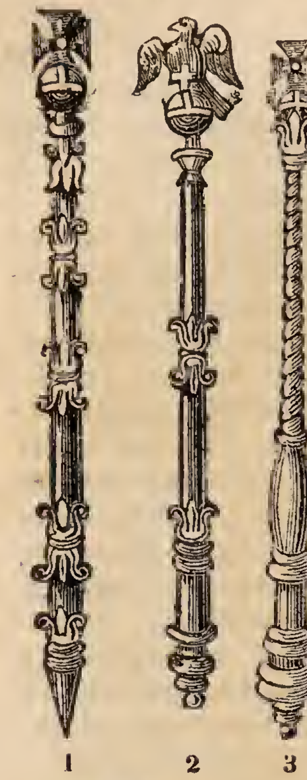
Above the altar, and reaching nearly to the vaultings, are amphitheatrical seats, occupied by the members of the House of Commons, with the Speaker in front. To the right, looking to the altar, above the Princesses' box, is the box set apart for the immediate accommodation of their Majesties' friends; and opposite to this, above the bench of Bishops, is the box devoted to the Foreign Princesses and Ambassadors.

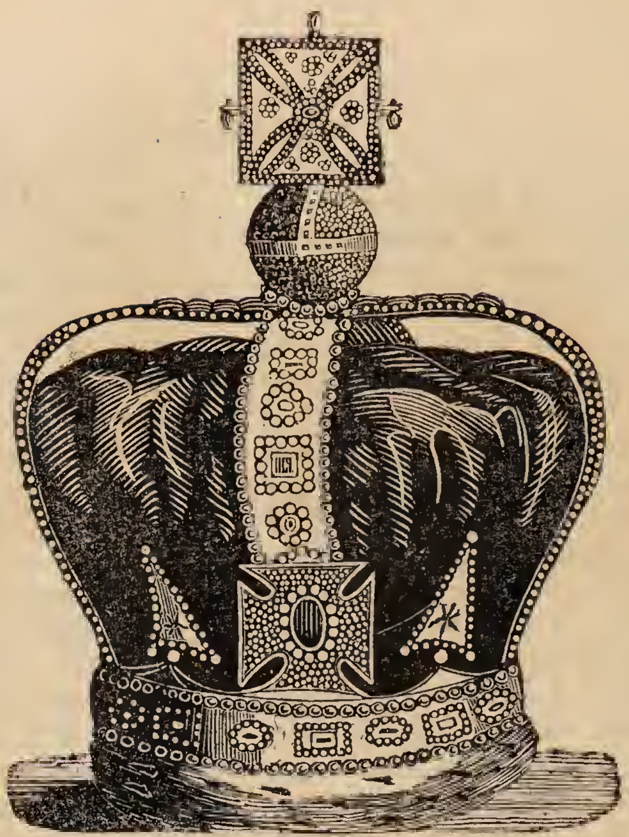
In the Transepts terminating at the edge of the Theatre, are seats rising one above the other, ten in number, occupied by the Peers and Peeresses—the Peers on his Majesty's side, and the Peeresses next her Majesty. Above these are a succession of seats, which were filled by the friends of the Peers and Peeresses. These stretch back to the great windows, and above those again is a new gallery level, with the vaultings, and for the first time erected in the Abbey, which was filled with visitors. There are double galleries on each side the Choir, as well as large galleries on each side of the Transepts, one of which, that on the left of the Queen, and fronting the Peeresses, was for the use of the Lord Great Chamberlain. The whole are covered with crimson cloth, and the vaulting galleries are protected by a double iron railing, to prevent accident. Nothing, in fact, could have been more admirably contrived for securing the greatest quantity of space, with the least possible interference with the general harmony of the scene. Five thousand sitting places were thus provided for which tickets were issued from the office of the Earl Marshal.

It having been arranged that the procession should pass through Pall Mall, Cockspur Street, Charing Cross, Whitehall, and Parliament Street, preparations were made in every favourable situation for the accommodation of visitors; and extensive galleries were erected in St. Margaret's Church Yard and the Abbey Yard.

A platform, with a cover, extended from Poets' Corner to the House of Commons, through which the Members passed to their places.

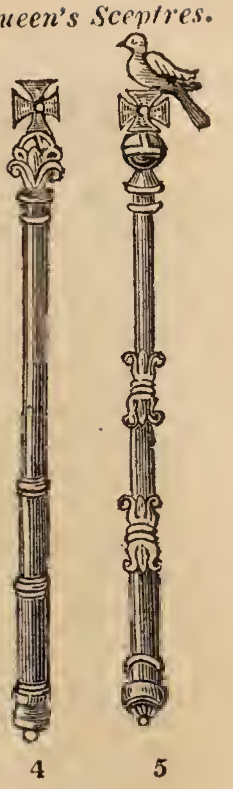
The King's Sceptres.

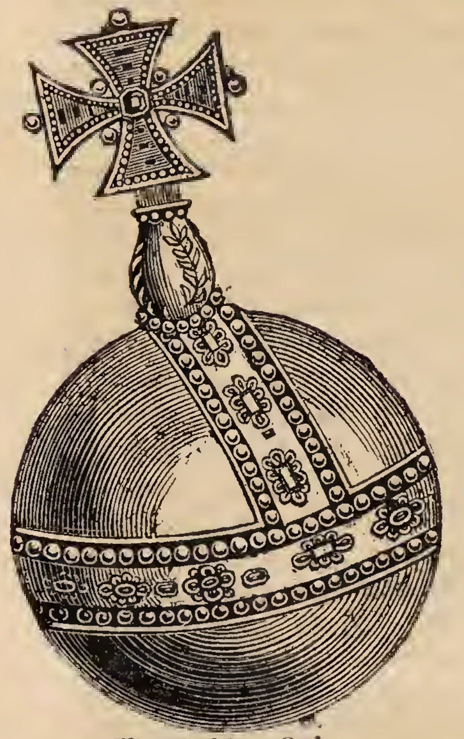




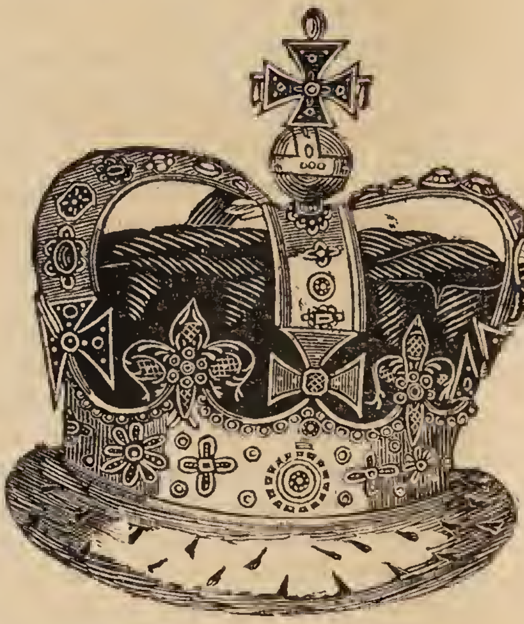
The King's Imperial Crown.

Queen's Sceptres.

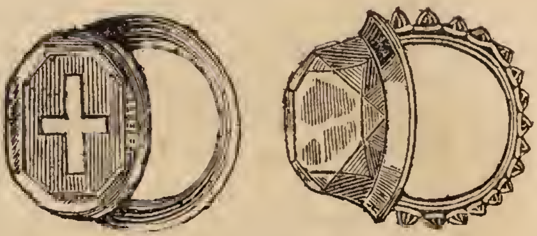




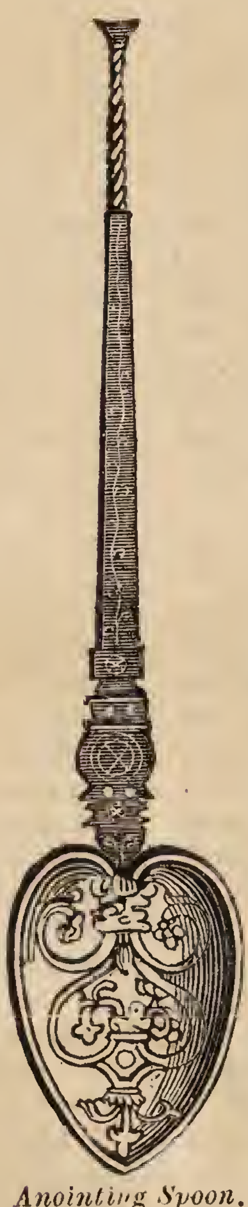
The Golden Orb.



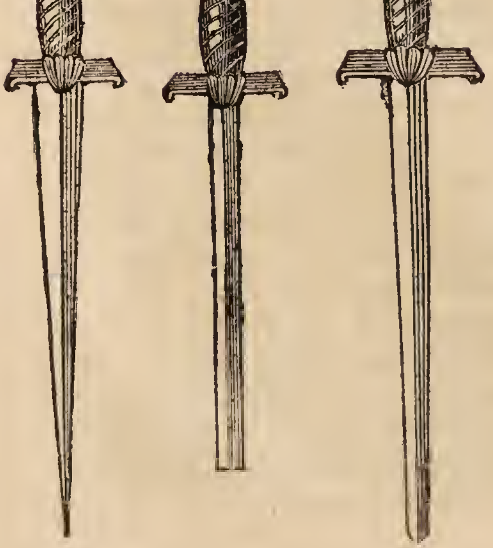
The Queen's Crown.



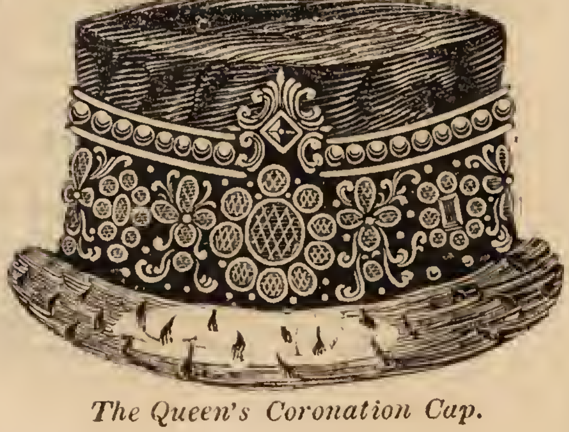
The Coronation Rings.



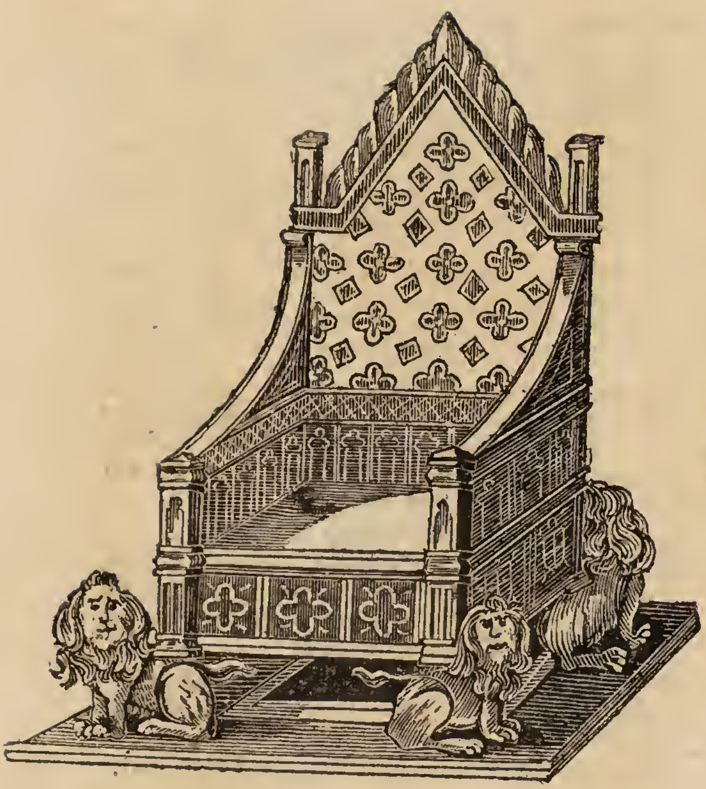
Anointing Spoon.



The Swords of Justice and Mercy.



The Queen's Coronation Cap.



Coronation Chair.

The Ampul, or Golden Eagle.

THE CORONATION PROCESSION.

On Thursday morning, the metropolis assumed an animated appearance almost from daybreak. At half-past five o'clock St. James's Park began to fill with persons, at which time the Royal Artillery, consisting of 150 men and several field-pieces, fired a royal salute of 21 guns; and from that hour numbers of persons were seen pouring in different directions towards the great focus of attraction, Westminster Abbey; a great number of persons, notwithstanding the coldness of the morning, were seated so early as five o'clock. At six o'clock a party of the Royal Artillery Corps of Volunteers arrived at St. James's Palace, and took their station opposite.

At seven o'clock a portion of the Royal Artillery Company arrived at Westminster Abbey, and they were stationed at the west door, at which his Majesty enters. The regiments of the Guards soon after arrived, and were placed at very short intervals, so as to make a clear road for his Majesty and the Royal Suite.

The band of the Life Guards was stationed in Waterloo Place, and tended greatly to enliven the scene, as did the band of the Horse Guards at Whitehall. Nearer the Abbey, also, other bands were stationed.

By six o'clock the interior of the Abbey presented a spectacle well worthy of the august ceremony by which this day was to be commemorated. From that time till nearly ten, the distinguished company arrived rapidly. The Lord Chadcellor went in his state carriage, which is of very ancient appearance. He was loudly cheered as he passed along, and within the Abbey he was received with unequivocal demonstrations of popularity; as was also the Duke of Wellington. At half-past eight o'clock the Lord Mayor, Sheriffs, and corporation, in twelve carriages, arrived. The Members of the House of Commons entered their gallery at nine o'clock, and, to one who was not aware of the character of the individuals for whom that gallery was reserved, it would occur that the representatives of the people were a body of military officers, so large was the proportion of the members who wore the military costume.

At twenty minutes before eleven o'clock a discharge of artillery announced that his Majesty had quitted the Palace. The yard of the Palace was surrounded by elegantly dressed females. His Majesty sat bare-headed, and appeared remarkably well. He was dressed in an Admiral's uniform, and we never recollect seeing him look better. The Queen was dressed in white, and wore on her head a tiara composed of brilliants. Her Majesty's appearance bespoke her to be in perfect health. As the carriages passed, the bands played "God tsave the King." As his Majesty passed the Park, he was received by a salute from the guns placed there for that purpose. As the procession proceeded, the King and Queen were loudly greeted by the assembled populace, who mingled their voices with the instruments of the military in crying "God save the King." His Majesty repeatedly placed his face to the window of the carriage, and appeared highly gratified at the scene which presented itself to his view. The Royal Procession moved in the following order:—

Squadron of Life Guards.

The Duke and Duchess of Gloucester and Attendants, in their Royal Highness's Two Carriages, each drawn by Six Horses, with a proper escort of Life Guards.

The Duchess of Cambridge and Attendants, in her Royal Highness's Two Carriages, each drawn by Six Horses, with her proper escort of Life Guards.

The Duke of Sussex and Attendants, in his Royal Highness's Carriage, drawn by Six Horses, with the proper escort of Life Guards.

The Duke and Duchess of Cumberland and Attendants, in their Royal Highness's Two Carriages, each drawn by Six Horses, with a proper escort of Life Guards.

The King's Barge-Master.

The King's Forty-eight Watermen.

THEIR MAJESTIES' CARRIAGES—each drawn by Six Horses.

2 Grooms. 1st CARRIAGE. 2 Grooms.
Drawn by Six Bays, conveying Gentleman Usher of the Privy Chamber to the Queen—Gentleman Usher Quarterly Waiter to the Queen, and Gentleman Usher Daily Waiter to the Queen.

2 Grooms. 2d CARRIAGE. 2 Grooms.
Drawn by Six Bays, conveying Gentleman Usher of the Privy Chamber to the King—Gentleman Usher Quarterly Waiter to the King—Gentleman Usher Daily Waiter to the King, and Gentleman Usher to the King.

2 Grooms. 3d CARRIAGE. 2 Grooms.
Drawn by Six Bays, conveying Equerry to the Queen—Page of Honour to the King—Page of Honour to the Queen, and Page of Honour to the Queen.

2 Grooms. 4th CARRIAGE. 2 Grooms.
Drawn by Six Bays, conveying Groom of the Bedchamber—Groom of the Robes—2 Pages of Honour to the King.

2 Grooms. 5th CARRIAGE. 2 Grooms.
Drawn by Six Bays, conveying Clerk Marshal — Vice-Chamberlain to the Queen—Page of Honour to the King, Lord of the Bedchamber.

2 Grooms. 6th CARRIAGE. 2 Grooms.
Drawn by Six Grays, conveying 2 Women of the Bedchamber—Vice-Chamberlain to the King, and Comptroller of the Household.

2 Grooms. 7th CARRIAGE. 2 Grooms.
Drawn by Six Bays, conveying 2 Maids of Honour—Treasurer of the Household, and Keeper of Privy Purse.

Grooms. 8th CARRIAGE. 2 Grooms.
Drawn by Six Bays, conveying 2 Maids of Honour—Lord of the Bedchamber in Waiting, and Master of the Robes.

3 Grooms. 9th CARRIAGE. 3 Grooms.
Drawn by Six Whites, conveying 2 Maids of Honour—Groom of the Stole, and Lord Chamberlain to the Queen.

3 Grooms. 10th CARRIAGE. 3 Grooms.
Drawn by Six Blacks, conveying Lady of the Bedchamber—Master of the Horse—Lord Steward of the Household, and Lord Chamberlain to the King.

A Squadron of Life Guards.

His Majesty's Equerries and Aides-de-Camp, on horseback, two and two, attended by one Groom each; and on either side by the King's two Yeomen Riders.

Deputy Adjutant-General, Deputy Quarter-Master General, and Deputy Adjutant-General of the Royal Artillery.

Quarter-Master General, Adjutant-General.

Twelve Footmen, four and four.

4 Grooms. THE STATE COACH. 4 Grooms.
Drawn by Eight Cream-coloured Horses, attended by a Yeoman of the Guard at each wheel, and two Footmen at each door—the Gold Stick and Captain of the Yeomen of the Guard, riding on either side, attended by two Grooms each—conveying

The King and the Queen,

The Mistress of the Robes, Lady of the Bedchamber in Waiting.

Master of his Majesty's Buck Hounds, on horseback, attended by two Grooms.

Six of his Majesty's Horses, with rich Trappings, each Horse led by Two Grooms.

Marshalmen in Ranks of Four.

Junior Exon and Clerk of the Check of the Yeomen of the Guard, on horseback.

One Hundred Yeomen of the Guard, four and four.

Senior Exon and Lieutenant of the Yeomen on horseback.

A Squadron of Life Guards.

Within the Abbey, at a quarter past ten, the choir commenced to play, while the thundering of the Park guns outside, heard deep amid the music and voices, announced that their Majesties had left their Palace of St. James's.

At eleven o'clock, a second royal salute from the Park guns, and the shouts of the populace outside, announced that the King and Queen had reached the Abbey.

The six Ladies of the Bedchamber in waiting immediately passed through the choir down into the nave, to meet her Majesty the Queen, at the great western entrance of the Abbey, and wait on her Majesty, during the ceremony. Their Majesties then advanced up the nave of the choir, in the following order, the choristers of the Chapel Royal and of Westminster singing the Anthem—'I was glad when they said unto me, we will go to the house of the Lord.'

Officers of Arms.

Prebendaries and Dean of Westminster.

His Majesty's Vice Chamberlain.

Comptroller of H. M. Household.	Treasurer of H.M. Household, bearing the Crimson Bag with the Medals.
Lord Chamberlain; his Coronet carried by a Page.—Lord Privy Seal; his Coronet carried by a Page.	Lord Steward; his Coronet carried by a Page.—Lord President of the Council; his Coronet carried by a Page.

Lord Chancellor of Ireland, attended by his Purse-Bearer; his Coronet carried by a Page.

Lord High Chancellor, attended by his Purse-Bearer; his Coronet carried by a Page.

Archbp. of Canterbury, in his Rochet, with his Cap in his hand; attended by two Gentlemen.

PRINCESSES OF THE BLOOD ROYAL, viz.

H. R. H. the Duchess of Cambridge, in a Robe of Estate of Purple Velvet, wearing a Circlet of Gold on her Head; her Train borne by a Lady of H. R. H.'s Bedchamber, assisted by a Gentleman of H. R. H.'s Household; her Coronet borne by Viscount Villiers.

H. R. H. the Duchess of Cumberland, in a like Robe, her Train also so borne; and her Coronet borne by Viscount Encombe.

H. R. H. the Duchess of Gloucester, in a like Robe of Estate, her Train borne in like manner; and her Coronet borne by Viscount Deerhurst.

The Queen's Vice-Chamberlain.

The Queen's Regalia; viz.—

The Ivory Rod with the Dove, borne by Earl Cawdor; his Coronet carried by a Page.	The Lord Chamberlain of Her Majesty's Household; his Coronet carried by a Page.	The Sceptre with the Cross, borne by the Earl of Jersey; his Coronet carried by a Page.
Two Serjeants at Arms.	Her Majesty's Crown, borne by the Duke of Beaufort; his Coronet carried by a Page.	Two Serjeants at Arms.

THE QUEEN,

Five Gentlemen Pensioners.	Archbishop of Armagh.	in Her Royal Robes; Her Majesty's Train borne by the Duchess of Gordon, in the absence of the Mistress of the Robes, assisted by Six Daughters of Earls, viz.—	Bishop of Winchester.	Five Gentlemen Pensioners.

Lady T. F. Strangways. Lady M. Pelham. Lady S. Cust. Lady T. Brabazon. Lady G. Bathurst. Lady G. Grey.

Ladies of the Bedchamber in waiting, viz.
Countess Brownlow. Marchioness Westmeath.

Maids of Honour, viz.
Hon. Miss Eden. Hon. Miss De Ros. Hon. Miss Seymour. Hon. Miss Bagot. Hon. Miss C. Boyle. Hon. Miss Mitchell.

Women of the Bedchamber, viz.
Lady Caroline Wood. Lady William Russell

The King's Regalia; viz.—

St. Edward's Staff, borne by the Duke of Grafton; his Coronet carried by a Page.	The Golden Spurs, borne by the Marquis of Hastings; his Coronet carried by a Page.	The Sceptre with the Cross, borne by the Duke of St. Albans; his Coronet carried by a Page.
The Third Sword, borne by the Marquis of Cleveland; his Coronet carried by a Page.	Curtana, borne by the Marquis of Salisbury; his Coronet carried by a Page.	The Second Sword, borne by the Marquis of Downshire; his Coronet carried by a Page.

Black Rod.	Garter.

Deputy Lord Great Chamberlain of England; his Coronet borne by a Page.

PRINCES OF THE BLOOD ROYAL, viz.

H. R. H. the Duke of Gloucester, in his Robes of Estate, carrying his Baton as Field Marshal; his Coronet borne by a Gentleman of H. R. H's. Household; his Train borne by Lord Edward Thynne.

H. R. H. the Duke of Sussex, in like Robes; his Coronet carried by a Gentleman of H. R. H's. Household; his Train borne by Lord John Spencer Churchill.

H. R. H. the Duke of Cumberland, in like Robes, carrying his Baton; his Coronet borne by a Gentleman of H. R. H's. Household; his Train borne by Lord Ernest Bruce.

High Constable of Ireland, Duke of Leinster; his Coronet borne by a Page.	High Constable of Scotland, Earl of Errol; his Coronet borne by a Page.

Earl Marshal of England, with his Staff; his Coronet carried by a Page.	The Sword of State, borne by Earl Grey; his Coronet carried by a Page.	Lord High Constable of England, the D. of Wellington, with his Staff, and Baton as Field-Marshal; his Coronet carried by a Page.

A Page carrying the Staff of the Lord High Steward.	Sceptre with the Dove, borne by the D. of Richmond; his coronet carried by a Page.	St. Edward's Crown, borne by the Lord High Steward, the Duke of Hamilton.	The Orb, borne by the Duke of Somerset; his Coronet carried by a Page.	A Page carrying the Coronet of the Lord High Steward.
	The Patina, borne by the Bishop of Carlisle.	The Bible, borne by the Bishop of Chichester.	The Chalice, borne by the Bishop of Rochester.	

THE KING,

Ten Gentlemen Pensioners, with their Standard Bearer.	The Bishop of Bath and Wells.	In His Royal Crimson Robe of State; His Majesty's Train borne by Six eldest Sons of Dukes; viz.	Archbp. of York, in the absence of the Bp. of Durham.	Ten Gentlemen Pensioners, with their Lieutenant.

Marq. of Worcester. Earl of Surrey. Earl of Euston. Marq. of Douro. Marq. of Titchfield. Earl of Lincoln,
assisted by the Master of the Robes;
and followed by the Groom of the Robes.

Groom of the Stole; his Coronet borne by a Page.	Gold Stick of the Life Guards in waiting; his Coronet borne by a Page.	Master of the Horse; his Coronet borne by a Page.

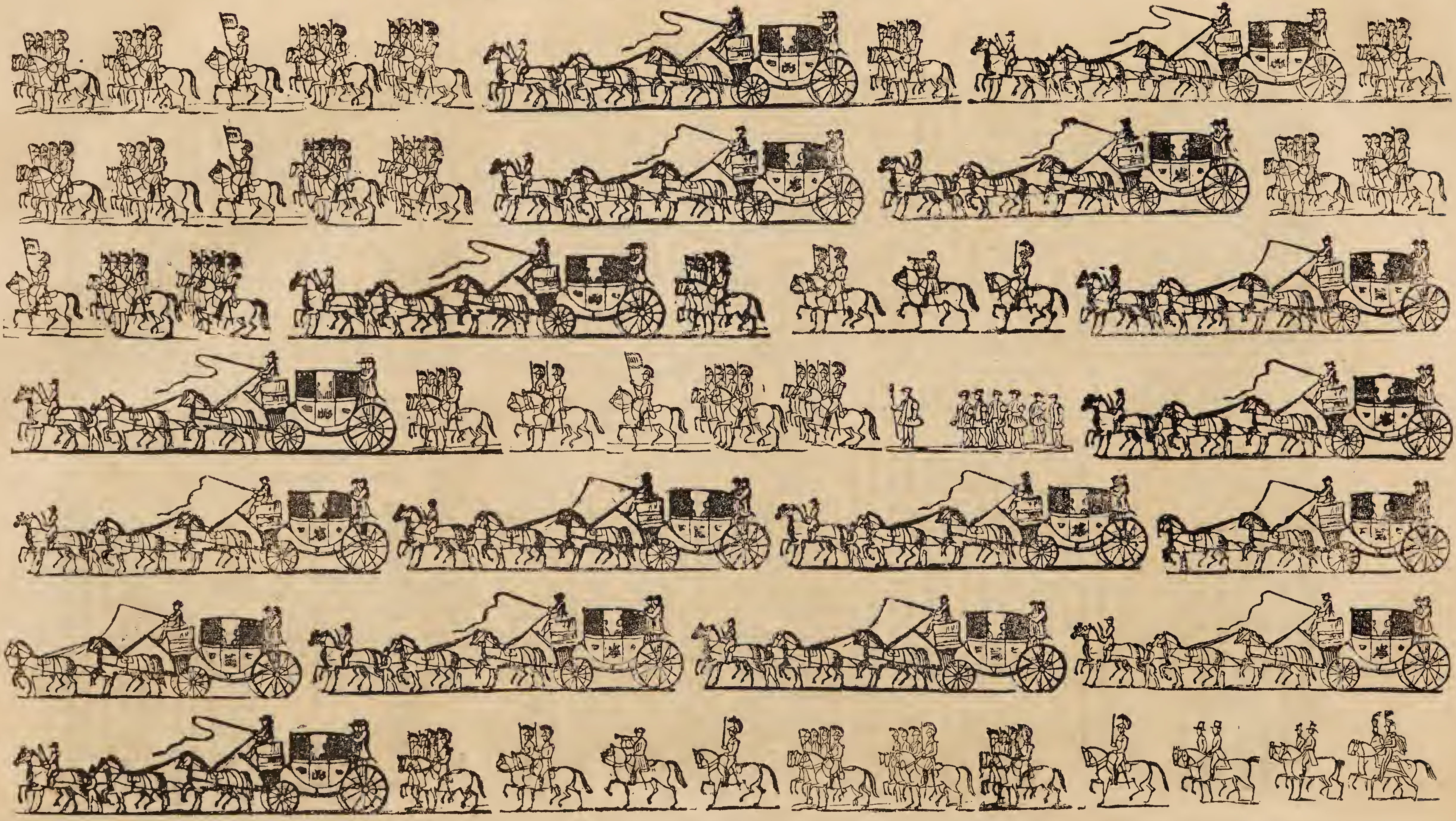
Captain of the Yeomen of the Guard; his Coronet borne by a Page.	Captain of the Band of Gentlemen Pensioners; his Coronet ditto.

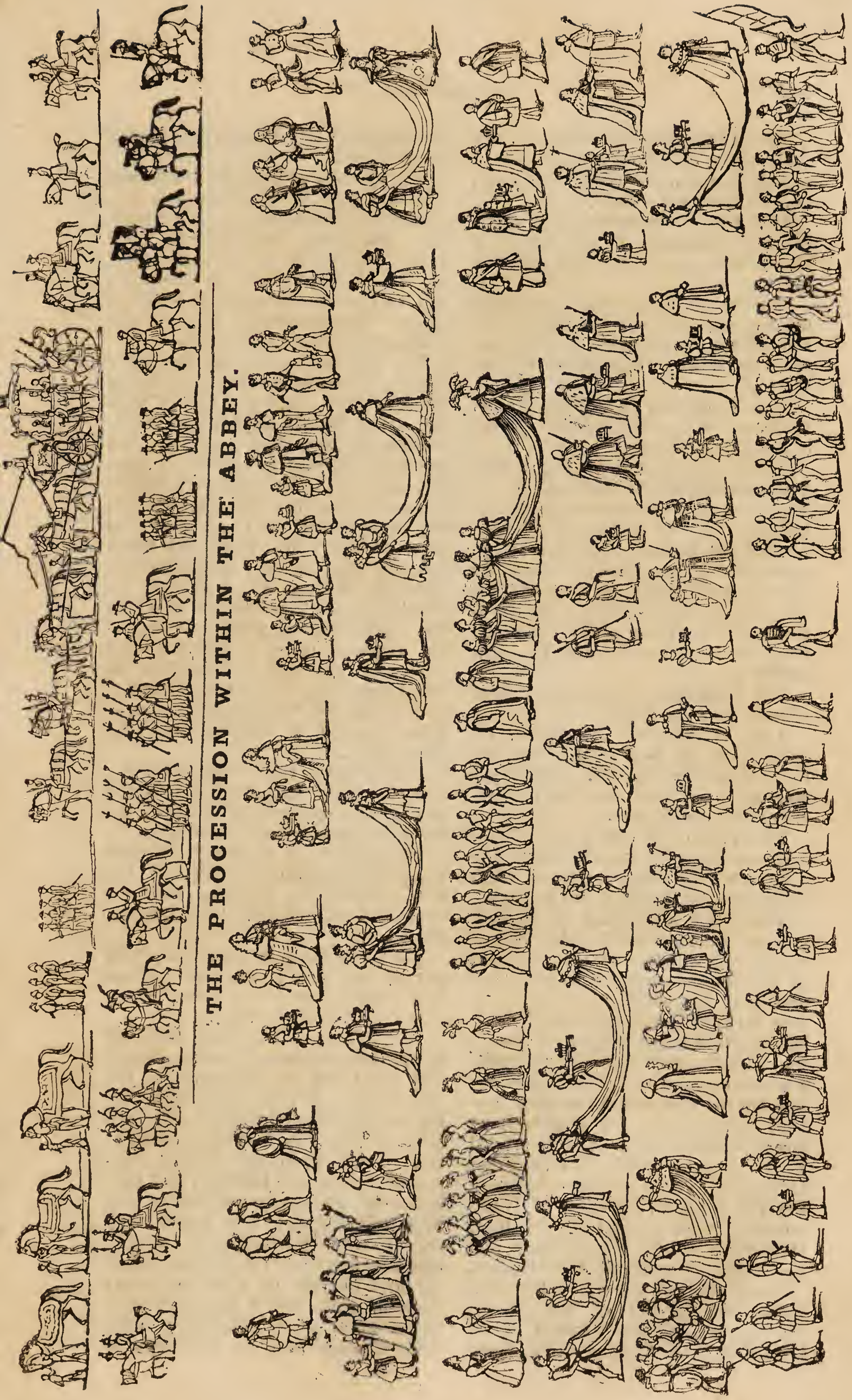
Lords of the Bedchamber, viz.—
Earl Amherst. Earl of Denbigh.
each attended by a Page to bear his Coronet.

Exons of Yeomen of the Guard.	Yeomen of the Guard.

Exons of the Yeomen of the Guard.

THE PROCESSION TO THE ABBEY.





THE PROCESSION WITHIN THE ABBEY.

The Prebendaries, entering the choir, ascended the theatre, and passed over it to the south side of the altar, beyond the King's chair.

The Vice-Chamberlain, Comptroller, and Treasurer of His Majesty's Household, passed to their respective seats.

The Dean of Westminster, the great officers, and the Lord Archbishop of Canterbury, ascended the theatre, and stood near the great south-east pillar thereof.

The Princesses and their attendants were conducted by the officers of arms to their box.

The Queen, preceded by her Vice Chamberlain, Lord Chamberlain, and the noblemen bearing her regalia, and attended as before-mentioned, ascended the theatre and passed on the north side of her throne to the chair of state and faldstool provided for Her Majesty on the east side of the theatre, below her throne, and remained standing by the chair until His Majesty's arrival.

The Serjeants at Arms took their places, near the theatre.

The Gentlemen Pensioners remained at the foot of the steps ascending to the theatre. The Yeomen of the Guard stood on the outside of the choir-door.

The Princes of the Blood Royal were conducted to their seats, by the officers of arms, as were also the High Constables of Scotland and Ireland.

The King, ascending the theatre, passed on the south side of his throne, to his chair of state on the east side of the theatre, opposite to the altar; and their Majesties, after their private devotion (kneeling on their faldstools), took their respective seats; the Bishops, their supporters, standing on each side; the Noblemen bearing the four swords on His Majesty's right hand; the Deputy Lord Great Chamberlain, and the Lord High Constable on his left; the Great Officers of State, the Noblemen bearing the Regalia, the Dean of Westminster, Garter, and Black Rod, standing about the King's chair, and the trainbearers behind His Majesty.

The Groom of the Stole, the Gold Stick, the Master of the Horse, the Captain of the Yeomen of the Guard, and the Captain of the Band of Gentlemen Pensioners, then passed to their seats.

The Queen's officers, the Noblemen who bore Her Majesty's Regalia, her Supporters, Train-bearers, and Assistants, stood near Her Majesty: her Lord Chamberlain on the right hand, her Vice-Chamberlain on the left; and the Ladies' Attendants behind her chair. The ceremonies of the Coronation then commenced with—

The Recognition.—Upon the conclusion of the anthem, the Archbishop of Canterbury, with the Lord Chancellor, the Deputy Lord Great Chamberlain, the Lord High Constable, and the Earl Marshal, preceded by Garter, moved to the east side of the theatre, where the Archbishop made the recognition, and repeated the same at the south, west, and north sides of the theatre; during which time His Majesty stood turning towards the people on the side at which the recognition was made; the assembly replying to each demand with loud and repeated acclamations of 'God save King William the Fourth;' and, at the last recognition, the trumpets sounded a flourish, and the drums beat.

His Majesty then took his seat; and the bible, the chalice, and the patina, were placed on the altar, by the Bishops who had borne them.

Two officers of the wardrobe then spread a rich cloth of gold, and lay two cushions on the same, for their Majesties to kneel on, at the steps of the altar.

The Archbishop of Canterbury then put on his cope; and the Bishops who were to read the Litany were also vested in their copes.

The Offering.—The King, attended by the two Bishops, his supporters, and the Dean of Westminster, the great officers and the noblemen bearing the Regalia and the Four Swords going before His Majesty, passed to the altar. Then the Queen, supported by the two Bishops, and preceded by the noblemen bearing Her Majesty's Regalia, also approached the altar. His Majesty, uncovered, and kneeling upon the cushion, made his first offering of a pall, or altar-cloth of gold, which was delivered by an officer of the wardrobe to the Lord Chamberlain, by his grace to the Deputy Lord Great Chamberlain, and by him to the King, who delivered it to the Archbishop of Canterbury, by whom it was placed on the altar. The Treasurer of the Household then delivered an ingot of gold, of one pound weight, being the second offering, to the Deputy Lord Great Chamberlain,' who having presented the same to the King, His Majesty delivered it to the Archbishop, by whom it was put into the oblation-basin.

The Queen, kneeling on the left hand of His Majesty, made her offering,—namely, a pall of gold, with the same ceremony. Their Majesties continued to kneel, while the prayer, 'O, God, who dwellest in the high and holy place,' was said by the Archbishop. At the conclusion of the prayer their Majesties arose. The King was conducted to the chair of state on the south side of the area, and Her Majesty to the chair on the left hand of the King. The Regalia, except the swords, were then delivered by the several noblemen who bore the same, to the Archbishop, and by his grace to the Dean of Westminster, to be laid on the altar; the great officers and the noblemen who had borne the Regalia, going to their respective places.

The Litany was read next, by the Bishops of Lichfield and Coventry, and Lincoln, vested in copes, and kneeling at a faldstool above the steps of the theatre, in the middle of the east side thereof. Then was read the beginning of the Communion Service, the Bishop of Llandaff reading the Epistle, and the Bishop of Bristol the Gospel. The sermon was preached by the Bishop of London, from the following text :—

☞ Second chapter of the First Epistle of Peter, 13th verse. 'Submit yourself to every ordinance of man, for the Lord's sake.'

His lordship proceeded to show that, without assigning what might be called divine right to political power, still the basis of human authority was to be found in God's word, and was to be traced solely to that divne origin. With respect to the obedience enforced to civil society, it was necessary only as far as it tended to the promotion of the honour and glory of God, and the advantage and happiness of the people. The right reverend prelate, after some further observations on the recognized foundation in the gospel of human authority, said, that laws which were in themselves good were readily obeyed. When the King who ruled the state was himself under the influence and guidance of true religion, law was obeyed and civil order was maintained. The compact entered into this day between the monarch and his people was mutual; both parties were bound by a solemn and sacred obligation—the Monarch to govern according to the law of the Christian Gospel, to mingle judgment with mercy, and to maintain the true religion; the subject, on his part, to pay the rule willing obedience, and to support him against all his enemies, open and concealed. The learned divine then paid a high compliment to the virtues, religious and moral, of the father and mother of his Majesty, the late George the Third and Queen Charlotte. After this eulogium, his lordship said that in a state it was not alone necessary that religion was merely tolerated; but it was equally necessary that it should be recognized and honoured in public acts and national proceedings. The good example of a Sovereign, in a free state like ours, always had great weight and influence; for if it were of importance that in private life purity should be promoted and encouraged—if the brightness of conjugal fidelity were to be prized, it was of importance indeed that those in whose hands Providence has placed it to give the *ton* to society should, by their own example, promote true religion and well-grounded morality. Let us therefore, said his Lordship, pray to him in whose hands are the hearts of Princes, that he who had now ascended the throne of his ancestors, might rule the people entrusted to his care in righteousness, and the fear of the Lord.

During the sermon, the King wore his cap of state of crimson velvet, turned up with ermine, and sat in his chair on the south side of the area, opposite the pulpit; his supporters, the Deputy Great Chamberlain, and the noblemen carrying the swords, standing by him. The Archbishop of Canterbury took his seat in a purple velvet chair, on the north side of the altar, Garter standing near him; the Bishops on their benches along the north side of the area; the Dean and Prebendaries of Westminster standing on the south side of the area, east of the King's chair, and near the altar.

The Oath.—The sermon being concluded, the Archbishop of Canterbury advanced to the King, and administered the coronation oath. The King arose from his chair of state, and, attended by his supporters and the Deputy Lord Great Chamberlain, advanced, uncovered, to the altar, where, kneeling upon the cushion laid on the steps, and placing his hand on the holy gospels, his Majesty took the oath, and added thereto his royal sign manual, the Lord Chamberlain of the Household holding a silver standish for that purpose, delivered to him by an officer of the Jewel Office. The following is the form of the oath:—

Archbishop. Will you solemnly promise and swear to govern the people of this kingdom of England, and the dominions thereunto belonging, according to the statute of Parliament agreed on, and the laws and customs of the same?

King. I solemnly promise so to do.

Arc. Will you, to your power, cause law and justice in mercy to be executed in all judgments?

King. I will.

Arc. Will you, to the utmost of your power, maintain the laws of God, the true profession of the Gospel, *and the Protestant Reformed Religion established by law?* And will you preserve unto the Bishops and Clergy of this realm, and to the churches committed to their charge, all such rights and privileges as by law do or shall pertain unto them or any of them?

King. All this I promise to do.'

After which, the King, laying his hand upon the Holy Gospel, said, 'The things which I have before promised, I will perform and keep: so help me God:' and then kissed the book, as is customary in common oaths throughout the kingdom.

The King having returned to his chair, the following hymn was next sung, the Archbishop reading the first line, 'Come, Holy Ghost, our souls inspire,' &c.

The Anointing.—Upon the conclusion of the hymn, the Archbishop read the prayer preparatory to the anointing, 'O Lord, Holy Father, who, by anointing with oil, didst of old make and consecrate kings, priests, and prophets,' &c. At the conclusion of this prayer, the choir sung the grand coronation anthem, 'Zadock, the priest,' &c. During this anthem the King was disrobed of his crimson robes by the Deputy Lord Great Chamberlain, who delivered them to the master of the robes; and his Majesty having taken off his cap of state, the Deputy Lord Great Chamberlain delivered the same to the Lord Chamberlain; and the robes and the cap were immediately carried into St. Edward's Chapel, the robes by the Groom of the Robes, the cap by the officer of the Jewel Office. St. Edward's chair (the coronation chair, which is the subject of one of our engravings), covered with cloth of gold, having been placed in front of the altar, his Majesty took his seat therein to be anointed, when four knights of the garter, viz. the Dukes of Leeds, Rutland, Newcastle, and Northumberland, summoned by Garter, held over the King's head a rich pall or cloth of gold, delivered to them by the Lord Chamberlain, who had received the same from an officer of the wardrobe, and the Dean of Westminster stood by, holding the ampulla containing the consecrated oil, and poured some into the anointing spoon. The Archbishop then anointed his Majesty on the head and hands, in the form of a cross, pronouncing the words, 'Be thou anointed,' &c.

The King then kneeling, the Archbishop, standing on the north side of the altar, pronounced the benediction. The Knights of the Garter returned the pall to the Lord Chamberlain, and returned to their seats.

The Investing with the Supertunica.—The Dean of Westminster then received from the officers of the wardrobe the supertunica of cloth of gold, with which the dean arrayed his Majesty.

The Spurs.—After this, the Dean took the spurs from the altar, and delivered them to the Deputy Lord Great Chamberlain, who, kneeling down, touched his Majesty's heels therewith, and returned them to the Dean, by whom they were again laid upon the altar.

The Sword.—The nobleman carrying the sword of state, now delivered it to the Lord Chamberlain, and, in lieu thereof, received from his grace another sword, in a scabbard of purple velvet (presented to his grace by an officer of the Jewel Office), which his lordship delivered to the Archbishop, who laid it on the altar, and repeated the prayer, 'Hear our prayers, O Lord, we beseech thee, and so direct and support thy servant King William,' &c.

The Archbishop then took the sword from off the altar, and, assisted by other bishops, delivered it into the King's right hand, saying, 'Receive this kingly sword,' &c., and 'With this sword do justice,' &c.

Offering of the Sword.—The King, rising up, went to the altar, where his Majesty offered the sword in the scabbard (delivering it to the Archbishop), and then retired to his chair; the sword was then handed to the nobleman who first received it, and who carried it during the remainder of the solemnity, having first drawn it out of the scabbard, and delivered the latter to an officer of the wardrobe.

The Investing with the Mantle —The King then standing, his Majesty was invested by the Dean with the imperial mantle, or Dalmatic robe of cloth of gold, delivered to him by the officers of the wardrobe; the Deputy Lord Great Chamberlain fastened the clasps.

The Orb.—The King then sitting down, the Archbishop, having received the orb from the Dean, delivered it into the King's right hand, saying, 'Receive this imperial robe and orb,' &c. His Majesty then returned the orb to the Dean, who laid it on the altar.

The Ring.—The Lord Chamberlain of his Majesty's Household then, receiving from the officer of the Jewel Office the ruby ring, delivered the same to the Archbishop, who put it on the fourth finger of the King's right hand, saying, 'Receive this ring,' &c.

The Dean then brought from the altar the two sceptres with the cross and dove, and delivered them to the Archbishop. In the mean time, the Duke of Norfolk, as Lord of the Manor of Worksop, presented to the King a glove for his Majesty's right hand, embroidered with the arms of Howard, which his Majesty put on.

The Sceptres. — The Archbishop then delivered the sceptre with the cross into his Majesty's right-hand, saying, 'Receive the royal sceptre,' &c.; and then the sceptre with the dove into his left hand, saying, 'Receive the rod of equity,' &c.

The Duke of Norfolk, as Lord of the Manor of Worksop, supported his Majesty's right arm.

The Crowning.—The Archbishop, standing before the altar, and having St. Edward's crown before him, then took the same into his hands, and consecrated and blessed it with the prayer, 'O God, who crownest thy faithful servants with mercy,' &c. Then the Archbishop, assisted by other bishops, came from the altar, the Dean of Westminster carrying the crown, and the Archbishop took it and placed it on his Majesty's head; while the spectators, with loud and repeated shouts, cried 'God save the King,' &c.; the Archbishop next pronounced the exhortation—'Be strong and of a good courage,' &c.; after which the choirs sung the following anthem: 'The King shall rejoice in thy strength,' &c.

The Holy Bible.—The Dean then took the Holy Bible from the altar, and delivered it to the Archbishop, who, attended by the rest of the bishops, presented it to the King, saying, 'Our gracious King,' &c. The King then returned the Bible to the Archbishop, who gave it to the Dean, to be by him replaced on the altar.

The Archbishop then pronounced the benedictions, the Bishops and the Peers answering each benediction with a loud amen. The Archbishop then turned to the people, and said the prayer, 'And the same Lord God Almighty grant,' &c. The *Te Deum* was next sung in fine style by the choir, during which time the King removed to the chair on which he first sat.

The Inthronization.—*Te Deum* being ended, the King ascended the theatre, and was enthroned by the Bishops and Peers; and the Archbishop pronounced the exhortation, 'Stand firm and hold fast,' &c.

The Homage.—His Majesty then delivered the sceptre with the cross to the Duke of Norfolk, as Lord of the Manor of Worksop, who held the same in his right hand, and the sceptre with the dove to the Duke of Richmond, who held the same on his left hand, during the homage.

The Archbishop then knelt before the King, and, for himself and the other lords spiritual, pronounced the words of homage, they kneeling around him, and saying after him. The Archbishop then kissed His Majesty's left cheek, and the rest of the lords spiritual did the same, and retired.

Then the Duke of Cumberland, ascending the steps of the throne, and taking off his coronet, knelt before the King, and, for himself and the other Dukes of the Blood Royal, pronounced the words of homage, the rest putting off their Coronets, kneeling with him and about him, and saying after him. The Duke of Cumberland then touched the Crown upon His Majesty's head, and kissed His Majesty's left cheek; the rest of the Dukes of the Blood Royal doing the like after him, and then retiring. The Dukes and other Peers went through the same ceremony, the senior of each degree pronouncing the words of homage, and the rest of the same degree saying after him, and each Peer of the same degree, successively, touching His Majesty's Crown, and kissing His Majesty's left cheek, and then retiring.

Anointing, Crowning, and Enthroning the Queen.—The Queen having reposed herself in her chair on the south side of the altar during the coronation and enthronization of His Majesty, as soon as the anthem was ended, arose, and being supported as before, went to the altar, attended by her trainbearer and ladies-assistants; and Her Majesty knelt whilst the Archbishop said the prayer of consecration. Her Majesty then arose and went to the faldstool, placed before the altar, between the steps and King Edward's chair; and standing there, the chief lady who usually attends Her Majesty took off her circle of gold, and delivered it to Her Majesty's Lord Chamberlain.

The Queen then knelt down, and four Duchesses, appointed for that service, held a rich pall of silk or cloth of gold over Her Majesty, while the Archbishop poured the consecrated oil upon her head, saying, 'In the name of the Father,' &c.

Then the Archbishop received from the officer of the Jewel Office the Queen's ring, and put the same on the fourth finger of her Majesty's right hand, saying, 'Receive this ring,' &c.

The Archbishop thereupon took the Crown from the Altar, and reverently set it on the Queen's head, saying, 'Receive the Crown,' &c.

Her Majesty being crowned, all the Peeresses put on their coronets; and then the Archbishop placed the Sceptre with the Cross in her Majesty's right hand, and the Ivory Rod with the Dove in her left, and offered up the prayer, 'O Lord, the giver of all perfection,' &c.

The Queen, being thus anointed and crowned, and having received all her ornaments, the choirs sung the Hallelujah Chorus.

At the commencement of the chorus, the Queen arose, and, supported as before, ascended the theatre (reverently bowing to his Majesty as she passed the throne), and was conducted to her own throne on the left hand of that of the King, where Her Majesty sat until the conclusion of the chorus.

The Holy Sacrament.—After the chorus, the two Bishops who had read the Epistle and Gospel received from the Altar, by the hands of the Archbishop, the patina and the chalice, which they carried into St. Edward's Chapel, and brought from thence the bread upon the patina, and the wine in the chalice. Their Majesties then descended from the thrones, and went to the altar, where the King, taking off his Crown, delivered it to the Deputy Lord Great Chamberlain to hold, and the sceptres to the Dukes of Norfolk and Richmond. Then the Bishops placed the patina and chalice in the King's hands; and His Majesty delivered them to the Archbishop, who reverently placed the same upon the altar, covering them with a white linen cloth. The Queen, also taking off her crown, delivered it to her Lord Chamberlain to hold, and the sceptres to those noblemen who had previously borne them. Their Majesties then went to their chairs on the south side of the area. When the Archbishop and the Dean had communicated, their Majesties approached the

Altar, and received the sacrament, the Archbishop administering the bread, and the Dean of Westminster the cup.

The King and Queen then put on their crowns, and taking the sceptres in their hands as before, again repaired to their thrones, supported and attended as before.

The Archbishop then read the communion service, and pronounced the blessing : and, at the conclusion, the trumpets again sounded and the drums beat.

After which, His Majesty, attended as before, the four Swords being carried before him, descended into the area, and passed through the door on the south side of the altar, into St. Edward's Chapel ; and the noblemen who had carried the Regalia received them from the Dean of Westminster as they passed by the altar into the Chapel.

The Queen at the same time, descending from her throne, went into the same chapel, at the door on the north side of the altar.

Their Majesties being in the Chapel, the King, standing before the altar, delivered the Sceptre with the Dove, which His Majesty had borne in his left hand, to the Archbishop, who laid it upon the Altar.

His Majesty was then disrobed of his royal robe of state, and arrayed in his royal robe of purple velvet by the Deputy Lord Great Chamberlain.

The Archbishop then placed the orb in His Majesty's left hand.

The noblemen, who carried the gold spurs, and St. Edward's staff, now delivered the same to the Dean, to be by him deposited on the Altar.

This being the last of the ceremonies, whilst their Majesties were in St. Edward's Chapel, the officers of arms were arranging the return, so that all were ready to move at the moment when the King and Queen left the chapel.

Their Majesties, and the Princes and Princesses, then proceeded out of the choir, and to the west door of the Abbey, attended as before ; their Majesties wearing their Crowns ; the King bearing, in his right hand, the Sceptre with the Cross, and, in his left, the Orb ; and the Queen bearing, in her right hand, her Sceptre with the Cross, and, in her left, the ivory rod with the Dove : their Royal Highnesses the Princes and Princesses wearing their coronets ; and the Princes who are Field-Marshals carrying their batons. The Four Swords were borne before the King, in the same order as before. The Dean and prebendaries, and the Bishops, who had carried the Bible, the chalice, and the patina, remained in the choir. The noblemen who had severally carried the Crowns, the Orb, the Sceptre with the dove, the Spurs, and St. Edward's staff, walked in the same places as before, those who had staves and batons carrying the same ; all the Peers and Peeresses wearing their coronets ; and the Archbishops, and the Bishops supporting their Majesties, wearing their caps ; and the Kings of Arms their crowns.

On arriving at the west door of the Abbey, garter proclaimed the King's style, which we give as it was last settled, at the union with Ireland :—

> William IV., by the Grace of God, of the United Kingdom of Great Britain and Ireland, King, Defender of the Faith ; and of the United Church of England and Ireland, on earth the supreme head.' In the Latin it is differently expressed : 'Gulielmus Quarto Tertius Dei Gratiâ Britanniarum Rex, &c. ; the word Britanniarum, first introduced upon that occasion, being regarded as expressive under one term, of the incorporated Kingdoms of England, Scotland, and Ireland. James the Frst, when he ascended the throne of England, revived the title which had been laid aside by an edict of Egbert in the commencement of the ninth centuary, and styled himself King of Great Britain, comprehending under that appellation his dominion over England and Scotland ;--Before the 'Union of the Crowns,' Britain alone was in general used in the style of our Sovereigns, to signify England and Wales : Alfred, however, was called Governor of the Christians of Britain ; Edgar Monarch of Britain ; Henry the Second, King of Britain ; and, synonymous with the latter, John was styled Rex Britonium.*

The procession then returned to St. James's Palace, in the order in which it came. At the residence of Mr. Adair, in Pall-Mall, the Landgravine of Hesse Homburg, the Duchess of Saxe-Weimar, Prince George of Cumberland, Prince George of Cumbridge, and some of the junior branches of the Royal Family, viewed the procession.—We conclude with the sentiment in the hearts of millions of his Majesty's subjects—

Long Live the King and Queen.

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* Vide Brady's Clavis Calendaria.

PUBLIC REJOICINGS.

In London the day of their Majesties' coronation was an universal holyday. All the Theatres and the Vauxhall Gardens were thrown open gratis, by direction of the government; a balloon ascended from the north of London; and fireworks were exhibited in Hyde Park. A general illumination, on the most splendid scale, enlightened the metropolis in the evening. It is impossible to do justice to the emulation that every where prevailed in the costliness and grandeur of this exhibition; but the following attracted particular attention :—

The Public and Government Offices.

Bank of England—The letters W. and A. and a very large imperial coronet, enclosed with a row of lamps.

Mansion House—Their Majesties' initials, crown, and laurel branches.

New Post Office—the beautiful fluted columns were wreathed with amber-coloured lamps.

Admiralty—Over the screen in front of this building, at either end a very capacious star; in the centre, the letters W. R. and A. R., surmounted by a large crown and anchor; and along the whole front, in large letters, God save the King, and Rule Britannia.

Horse Guards—Within the gates two large coronets, and a garter-star encircled with sprigs of laurel; the initials of the King and Queen, and the star of Brunswick. In front of the officers' mess-room, a large star.

The Army Pay Office had a crown above the W. R.

The Home Office—The initials of the King and Queen, with a star, and the crown encircled by sprigs of laurel.

Colonial Office—A similar exhibition.

Foreign Office—A large W. and A., with a crown, star, and laurel, and the windows edged with lamps.

Council Chamber—Festoons of lamps between the pillars.

Board of Ordnance—Eclipsed most other exhibitions. Along the parapet, at equal distances, were a number of transparent globes; under which was the crown, to which were made fast two cables, and at their ends two large anchors. In the centre were two transparent paintings of Magna Charta, and the Ordnance arms; on either side medallions of the King and Queen, their Majesties' initials, stars, diamonds, clusters of cannon-balls, &c., occupying the entire front of the building.

Somerset House.—W. R. and A. R., in the centre, with a star and a crown at top.

THE CLUB-HOUSES, &c. Crockford's—A beautiful transparent painting of the arms of England, between the half length portraits of the King and Queen. At the top, a crown of England, and their Majesties' initials, and at each end a star and an anchor, encircled with laurel.

The Guards exhibited a crown, surmounting the initials of their Majesties, encircled with laurel; on the left the star of the order of the Garter, and on the right of St. Andrew, and underneath a grenade in a state of fusion; the whole represented in gas-light.

White's—W. A. R., encircled with laurel and surmounted by a diadem.

Boodle's—A crown and star, encircled with laurel; underneath, the King's initials, diamonds, and festoons.

Arthur's—A crown, with a glory star under it, and W. A. at either end, with wreaths, &c. &c., illumined with gas.

Cocoa-Tree—A large crown and anchor in the centre of W. A. with knots of lamps and other devices.

Fenton's—A magnificent star.

Albion—Large crown and star, and W. A.

Thatched-House—W. A. and a crown and star.

Brooks's—W. A. R., the crown at top, and festoons.

Ellis's—Crown, star, and W. A.

University Club-House—A brilliant star beneath the royal diadem; on either side the initials of their Majesties, encircled with laurels, diamonds, &c.

Athenæum—The King's initials, two stars, and crown, surmounted by a dove bearing an olive leaf; in gas.

Travellers' Club-House—Crown, W. A., laurel branches, stars, festoons, &c.

Burlington Arcade—W. A. R. and a crown; in the interior, rows of lamps and festoons, interspersed with leaves of laurel.

Willis's Musical Repository, St. James's Street—A star with W. A.

Green's Club-House, Regent Street—W.A. R. with a crown.

Union Club-House—Two stars, a crown, and wreath.

Howel and James's—Crown, two stars, and W. A. in gas.

Brecknell and Turner, Haymarket—W. A. and a crown.

Gayhurst and Harvey, Strand—A brilliant crown, with W. A.

Nash—W. A. and crown.

Egg, Gun-merchant, Piccadilly—Star.

London Cloth Hall—Two crowns, W. R., A. R., and star.

The Surrey Zoological Gardens were brilliantly illuminated—A superb anchor, star, W. A. flags, &c. &c.

A fine Portrait, with a Memoir, of his Majesty, William IV., taken when he was Lord High Admiral, is contained in Nos. 179—180 of The Casket, Price Twopence.

No 247 of The Casket is ready for delivery, containing Engravings of the various Crowns worn by all the Kings of England, and also of the Scottish Regalia, with full descriptions; besides a variety of other interesting matter, price only One Penny.

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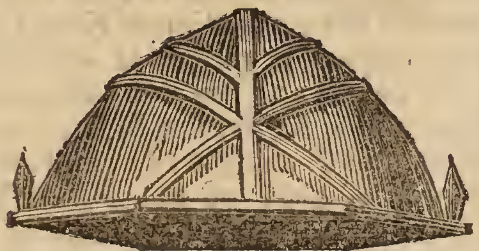
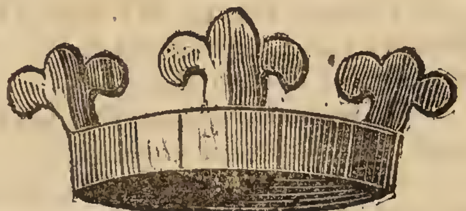


No. 1.—*Edward the Confessor.*



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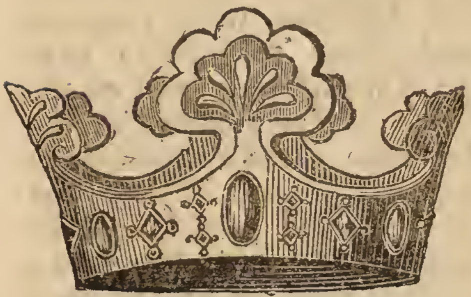
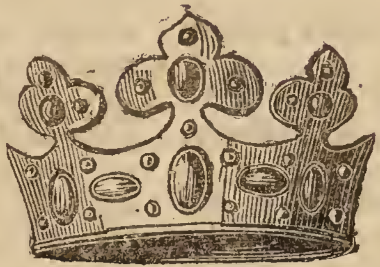


No. 3.—*Henry II.*



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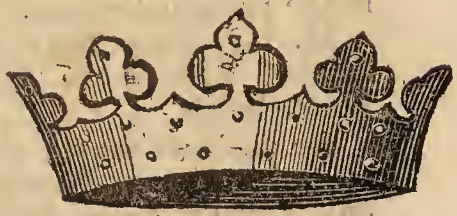

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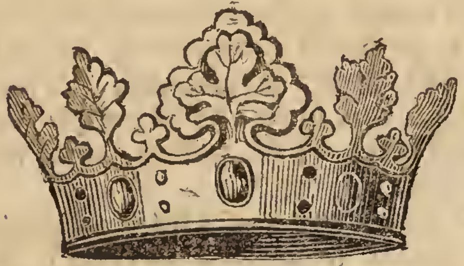

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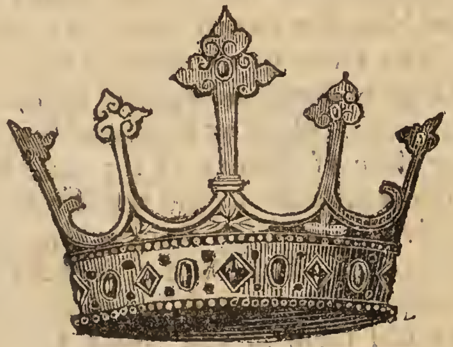
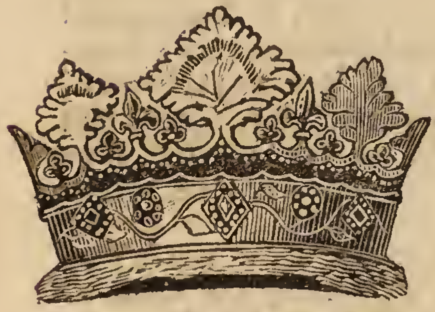


No. 7.—*Richard II.*



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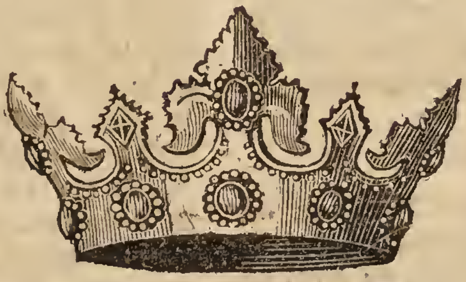
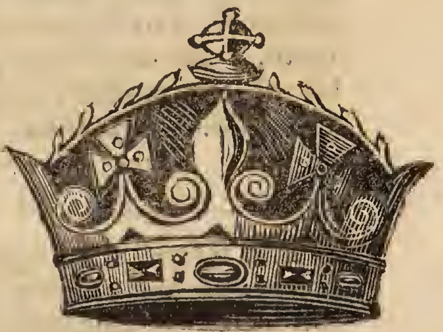


No. 9.—*Henry V.*



No. 10.—*Henry VII.*

THE annexed engraving represents the crowns of state or ceremony which the Kings of England were accustomed to wear. It is well known that on certain great festivals they appeared attired in all the Regalia of their office; hence the statements of our old historians that they were *repeatedly crowned.*

No. 1 of the engravings is the crown of Edward the Confessor, from his great seal; it is not improbable that it was fabricated by order of King Alfred, over-arched with gold wire-work, set with small stones, and adorned with two little bells. The knobs projecting on either side the crown may be these identical bells. Speed's print of the seal makes them, however, decidedly jewels, which perhaps they are. The sketch was made from an impression of the Confessor's seal. With the old Saxon crown for many ages the monarchs of England were invested, until the desecrating rage of republican fanaticism destroyed it.

No. 2, is another crown of St. Edward, as represented on the Bayeux tapestry.

247—*Sept.* 17, 1831. *Price One Penny.* VOL. V.—2 P

No. 3, is the Crown worn by Henry II. and Richard I.; the authority is their monuments at Fontrevaud.

4. The Crown of John, from his monument at Worcester.

5. That of Henry III. and Edw. I. Authority, the monument of Henry III. and that of Queen Eleanor.

6. Edward the Second's; his monument in Gloucester Cathedral.

7. Richard the Second's, from his portrait at Westminster.

8. Henry the Fourth's, from his monument.

9. Henry the Fifth's, from a picture in the royal collection.

10. Henry the Seventh's, from the painted window in St. Margaret's, Westminster.

An eleventh crown was afterwards made for Charles II. which being the one always since used, a correct engraving of it will be found among the Regalia in our Nos. 245 and 246.

The Crowns commonly worn by the Kings of England appear to have taken the overarched or imperial form about the time of Henry VI.; and there is little variation in the representation of their shape, until the regalia were destroyed. When the crown was made anew for the Coronation of Charles II., the old form of the State Crown appears to have been in some degree imitated, but the arches, in very bad taste, were depressed, giving the centre of the modern crown the form of a saddle.—*Gentleman's Magazine.*

* * *

THE REGALIA OF ENGLAND.*

The Regalia, or apparatus used on the grand and solemn inauguration of the kings of England, are, as well as most of the usages, very ancient.

"The Crown of England, with which the kings of England have generally been crowned, is called St. Edward's Crown. It is made in imitation of the ancient crown supposed to have been worn by that monarch, and which was kept in the abbey church of Westminster till the beginning of the late civil wars in the reign of King Charles the First, when, with the rest of the regalia, it was taken away, and sold in 1642. This very rich imperial crown of gold was made against the coronation of King Charles the Second; and it is embellished with pearls and precious stones of divers kinds, as diamonds, rubies, emeralds, and sapphires; and hath a mound of gold on the top of it, enriched with a band or fillet of gold, embellished also with precious stones. Upon the mound is a cross of gold, embellished likewise with precious stones, and three very large oval pearls, one of them being fixed on the top, and two others pendent at the ends of the cross. It is composed (as all the imperial crowns of England are), of four crosses pattée, and as many fleurs-de-lis of gold placed on a rim or circlet of gold, all embellished with precious stones. From those crosses arise four circular bars, or arches, which meet at the top in form of a cross, at the intersection whereof is a pedestal whereon is affixed the mound before mentioned. The cap within this crown is of purple velvet, lined with white taffeta, and turned up with ermine.*

"The Crown of State (estimated to be worth a million sterling), is exceedingly rich, being embellished with divers large rose, or faucet, and table diamonds, besides a great quantity of pearl; but it is most remarkable for a wonderful large ruby set in the middle of one of the four crosses, and esteemed to be worth 10,000*l.*; as also for that the mound is one entire stone of a sea-water green colour, known by the name of an agmarine. The cap is of purple velvet, lined and turned up as the former."†

The Queen's Crown is upon a similar construction to the King's, except that the mound is of gold. At former coronations, the diamonds, &c. used in its decoration, have been hired for the occasion; but her Majesty, with that becoming desire not to add to the public burdens, which characterizes all her actions, has adopted the more dignified course of causing her own jewels to be used. The crown, with its jewels, as used on the present occasion, is supposed to be worth 111,000*l*.

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* Engravings of the entire Regalia are given in Nos. 245 and 246 of the CASKET, containing the account of the coronation. The history of them we now print, in consequence of our not being able to insert it in the coronation number without omitting some of the particulars of that splendid ceremony.

* It has generally been supposed that the crown shown at the Tower is the same with which the several Kings of England have ever been crowned. This, however, is not the fact.

† The above description of the crowns is taken from Clark's Introduction to Heraldry, published by Washbourn, Salisbury Square.—To all who take interest in such matters, we recommend the work as the cheapest and best heraldic epitome extant.

The richly jewelled cap seen among our engravings is worn by the Queen in the procession and previous to her coronation.

The Sceptre is made of gold, the handle plain, the upper part wreathed, in length about two feet nine inches and a quarter, in circumference about three inches at the handle, and two inches and a quarter at the top. The pommel of the latter is enriched with rubies, emeralds, and small diamonds, and about five inches and a half above the handle is embossed, and embellished with sapphires; on the top is a mound with a cross. This is called St. Edward's Staff, and is more ancient than the crown. It is marked No. 1 among the engravings.

The King's Sceptre with the Cross (No. 2.) is of gold, similarly embellished, 5½ inches above the handle being curiously embossed and set with sapphires, rubies, emeralds, diamonds, and the top with leaves, from which rises a mound made of an amethyst garnished with diamonds, and a cross with a large table diamond in the centre.

The King's Sceptre with the Dove (No. 3.) is of gold, 3 inches in circumference at the handle, and two inches and three quarters at the top; and set with diamonds and precious stones. Upon the mound is a small Jerusalem cross, whereon is a dove, with wings expanded, as the emblem of mercy.

The Queen has two sceptres (Nos. 4 and 5). The first is of gold, with a mound and cross rising from the rose, shamrock, and thistle. The second is of ivory, with pommel and garniture of gold, the dove and cross on the top enamelled with white.

The Mound, Orb, or Globe (each signifying the world, the first a corruption of the French word *Monde*), which is put into the King's hand immediately before he is crowned, is a ball of gold, of six inches diameter, encompassed with a fillet of the same metal, embellished with diamonds and other precious stones; on the top whereof is a large amethyst, of a violet colour, near an inch and a half in height, over which four silver wires pass, which, joining at the top, support a very rich cross of gold. The signification of this as a badge of dominion, is evident.

There are Three Swords carried before the King at his coronation, besides the sword of state; the first of which, named Curteyn or Curtana, belonged to Edward the Confessor, and has been used at the public inaugurations of our princes ever since. The length of the blade is now thirty-two inches; originally it was much longer, but it has been broken off at the point to betoken mercy, justly reckoned the brightest prerogative of the sovereign. Edward the Third, when he was crowned, 1st of February, 1327, was the first of our kings who, in the exertion of that prerogative, proclaimed a general pardon, which has been since practised by succeeding monarchs. The second sword is pointed, though somewhat obtuse, and is denominated the Sword of Justice to the Spirituality; its blade is forty inches long, and one and a half broad. The third, or Sword of Justice to the Temporality, is sharp at the point, of the same length as the former, and one and three quarters in breadth.

The Mantle, Dalmatica, or open Pall; otherwise called the Imperial Pall;

The Supertunica, Surcoat, or close Pall;

The Armil;

The Colobium Sindonis, or Surplice;

The Surcoat;

The Buskins;

The Sandals;

The Spurs, called the Great Golden Spurs;

The Ampul, or Eagle of Gold; containing the holy oil for the ceremony of anointing;

The Faldstool, on which the King kneels at the altar;

The Anointing Spoon; and

The Rings called the King's and Queen's Coronation Rings, form the remainder of the regalia.

* * *

THE CORONATION CHAIR.

The Chair in which our kings are crowned, is made of solid hard wood throughout, variously painted. It was anciently kept at Scone or Scoon, in Scotland, and was esteemed the palladium of the Scottish nation; whose kings were also crowned in it, until the year 1296, when Edward the First, of England, the fourth, however, of that name, brought it away, and deposited it in the conventual church of Westminster; from which time the chair has been denominated St. Edward's Chair, and has been used as the English seat of coronation; it is in height six feet seven inches, in breadth at the seat thirty-eight inches, in depth twenty-four inches, and from the seat to the bottom twenty-five inches; four lions support each corner, leaving a space of nine inches between the chair and the bottom board, in which is enclosed a stone called "Jacob's Stone," or the "Fatal Marble Stone," which Edward the First also brought from Scotland, with the great charter called Ragman's Roll, and the Black Cross. The fable respecting this stone is, that Jacob rested on it all night in the open field, when he sought the fair Rachel, whence its present vulgar appellation of Jacob's Stone; and that it was removed into Spain, where it was used as the seat of Justice by Gethalus, coeval with Moses. The historical accounts of its first being brought into use are at variance, but each make it very ancient. Fergus the Second is said to have removed it to Scone in 413, in consequence of a prophecy then prevailing, that where that stone was kept, the Milesian line of kings, of which he was one, should govern a powerful monarchy. James the First of England and Sixth of Scotland, from a daughter of whom our present royal line derive their title, was lineally descended from Fergus. Many accounts agree in stating it to have been originally so dignified by Kenneth the First, in 605, who, having fought a bloody battle at Scone with the Picts, in which he gave them an overthrow, sat down to rest himself upon this stone, when his nobles crowned him with the garland of victory, which thence gave rise to the practice of all future kings of Scotland receiving their crowns on that stone, in the conceit that, like him, they should prove victorious over their enemies.

On this stone was written the following distich:—

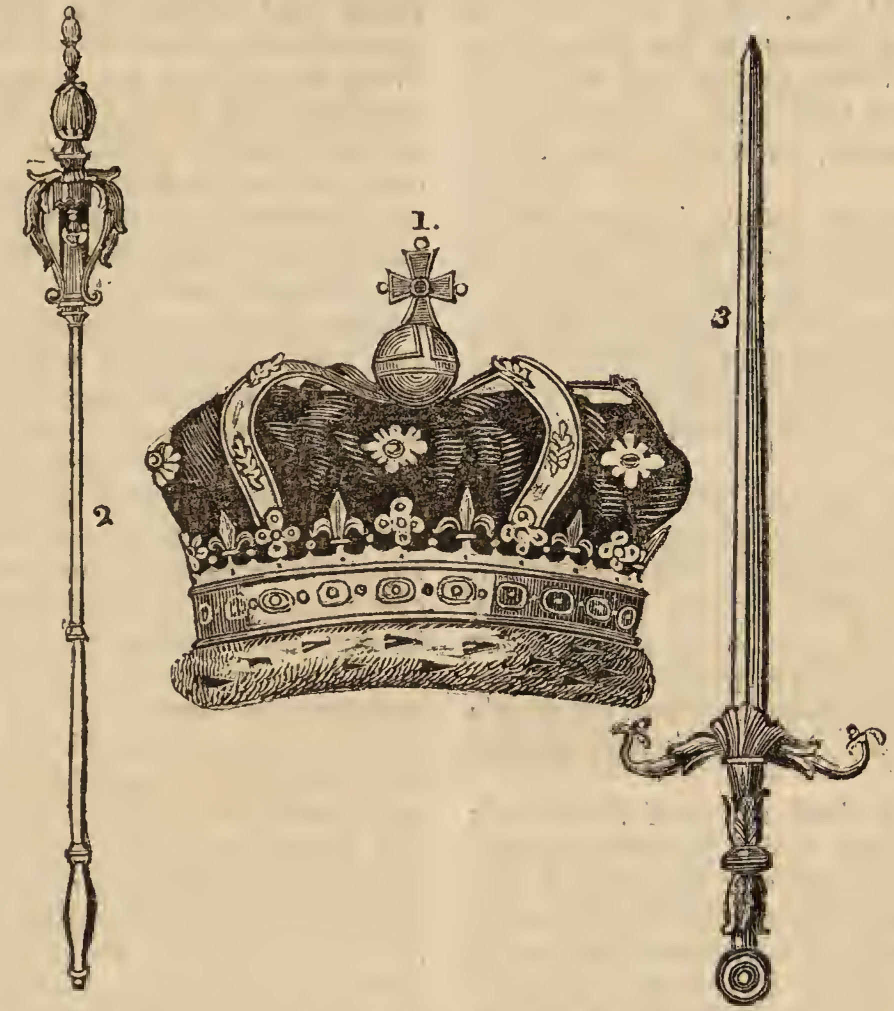
‘ Ni fallit fatum, Scoti quocunque locatum
Inveniant lapidem, regnare tenentur ibidem.’

Which has been thus translated:—

‘ Unless unalterable fate do feign,
Where'er they find this stone, the Scots shall reign.

THE CHAMPION.

The first account of a champion appearing in form to support the right of the monarch to the throne, was at the coronation of Richard the Second, (1377); the practice, nevertheless, is proved to have been of a much more remote origin; and William the Norman is almost generally thought to have been the first of our kings who introduced that ceremony, although there is not any historical record extant upon which to found such conclusion. Sir John Dymock claimed that honour at Richard's coronation, and exercised it as holding the manor of Scrivelsby, in Lincolnshire, in right of his wife, Margaret, the daughter of Sir John Marmion; at which time, also, Baldwin de Freville exhibited a petition for that dignity, in virtue of a like pretension from the Marmion family, in whom it was originally vested. Before the second course at the coronation dinner, Sir John, armed cap-a-pie, came into Westminster Hall, mounted on a horse richly caparisoned, and attended by two esquires, pages, &c., and by proclamation through Garter King at Arms, casts his gauntlet, and challenged to single and mortal combat whoever should dispute the King's right of succession. This service has, from that time to the present, been performed by the Dymock family; and they have constantly received a gilt cup and cover, full of wine, as their fee; the Sovereign, crowned, having first himself drank out of it, in compliment to his champion. The words of the challenge are: ‘If any person, of what degree soever, high or low, shall deny or gainsay our Sovereign Lord———King of Great Britain, France, and Ireland, defender of the faith, &c. to be right heir to the imperial crown of this realm of Great Britain, or that he ought not to enjoy the same, here is his champion, who saith that he lieth, and is a false traitor, being ready in person to combat with him, and in this quarrel will adventure his life against him, on what day soever shall be appointed.'*—*Clavis Calendaria*



REGALIA OF SCOTLAND.

THE following description, as well as the accurate engravings above, are taken from Clark's *Introduction to Heraldry*, of which we have already spoken.

It was by order of his late majesty, George IV., that search was made in 1817, in the crown-room of the castle in Edinburgh, for the insignia of the royalty and ancient independence of Scotland; respecting which much mystery had long existed. The success of this research gave great satisfaction to the antiquary, and more particularly to the people of Scotland.

The Crown is supposed to be the same with which Bruce was crowned in the year 1306; the old Regalia having previously been taken away, at the degradation of Baliol in 1296, by King Edward I. It is of an elegant form, the lower part being a golden diadem of two circles, embellished with pearls and precious stones; the upper circle surmounted by fleur-de-lis and crosses fleury, interchanged with large pearls alternately. The arches of gold, with enamelled figures, crossing each other, and surmounted by a ball of gold enamelled, over which is a cross pattée of pearls, were added by James V. The cap is of crimson velvet, turned up with ermine, and decorated with pearls.

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* A ludicrous circumstance occurred at the coronation of King William and Queen Mary: Charles Dymock, Esquire, who then exercised the right of being champion, cast his gauntlet on the pavement in the usual form, and the challenge was proclaimed, when an old woman, who had entered the hall on crutches, immediately took it up, and quitted the spot with extraordinary agility, leaving her crutches behind her, and a female glove, with a challenge in it, to meet the champion the next day in Hyde Park. Accordingly, the old woman, or, as is generally supposed, a good swordsman in that disguise, attended at the hour and place named in the challenge; but the champion did not make his appearance, nor does it appear whether any measures were taken to discover who had passed so unseemly a joke.

The sceptre is a slender rod of silver, thirty-two inches in length, with three figures at the head, representing the Virgin Mary, Saint Andrew, and Saint James, surmounted by a ball of rock crystal, &c. This was made in the reign of James, at the time of the alteration of the crown, and was used by the Lord Chancellor to touch acts of Parliament, in token of the royal assent.

The Sword of State is of beautiful workmanship, and was presented to James IV. by Pope Julius II.—The hilt is of silver gilded, and the cross beautifully adorned with filigree work. The sheath and belt are also of exquisite taste and beautifully ornamented.

The last Scottish coronation ceremony which took place was that of Charles II., at Scone, 1651, when the crown was borne by the unfortunate Argyle, who soon after died on the scaffold, and at the place of execution said, 'I placed the crown on the *king's head*, and in reward he brings mine to the block.'

These ancient relics of Scotland's regality, from which the accompanying illustrations have been taken, are now placed in the castle of Edinburgh, in the charge of four commissioners—*the Keeper of the Great Seal, the Lord Privy Seal, the Lord Justice Clerk,* and *the Lord Advocate,* with a deputy keeper, and under him two yeomen keepers, wearing the dress of the ancient yeomen of the guards, who have the liberty of exhibiting the Regalia to the public.

* * *

THE ROYAL TOUCH.

The following proclamation, issued in the reign of Charles I., April 22, 1634, will perhaps afford some gratification to the curious. The practice it alludes to (touching for the king's evil) is mentioned with the most amusing gravity, though at present esteemed one of the most ridiculous of vulgar errors:

BY THE KING.

Whereas, by the grace and blessing of Almighty God, the kings and queens of this realm, by many ages past, have had the happiness, by their sacred touch, to cure those who are afflicted with the disease called the king's evil; and his now most excellent majesty, in no less measure than any of his royal progenitors, hath had blessed successe therein; and, in his most gracious and pious disposition, is as ready and willing as any king or queene of this realme ever was, in any thing to relieve the distresses and necessities of his good subjects: yet in his princely wisdome, foreseeing that in this (as in all things) order is to be observed, and fit times are necessary to be appointed for performing this great worke of charity; and taking into his royall consideration the great inconveniences which happen, both in respect of contagion, which may happen in this neere accesse to his majestie's sacred person, when the season of the year is growne warm: doth hereby publish and declare his royal pleasure to be, and also will and command, that from the time of publishing this proclamation, no person or persons whatsoever do attempt or presume to repair to his majesty's royal court, to be healed of that disease, before the feast of All Souls now next coming: and to the end that all his loving subjects may the better take notice of this his majesty's pleasure and command, his pleasure is, that this proclamation be published and affixed in some fit and open place in every market-town of this realme.

* * *

POWERFUL EFFECTS OF IMAGINATION.

Dr. Darwin relates the following instance of the power of fancy, which two centuries ago would undoubtedly have been accounted witchery:—A young Warwickshire farmer, finding his hedges broken and robbed during a severe winter, determined to watch for the thief. He chose a moonlight night, and lay many hours beneath the shade and shelter of a haystack. He suffered much from cold, and at midnight was about to retire; but, at that moment, appeared a decrepit old woman, of appearance much corresponding with the popular notion of a witch; she hastily collected a bundle of sticks from the hedge, and was about to carry them off; the farmer sprung from his concealment, and seized the old woman as the nightly thief of his property. After some struggling, the old woman, who had displayed great personal strength and determination, suddenly knelt down upon her bundle of sticks, and, after silently raising her withered arms to the moon, then at the full, she thus addressed the already half-frozen farmer—'Heaven grant that thou mayest never again enjoy the blessing of warmth!' The terrified farmer left her, and made his way home, under the full effect of the cold spell. He complained of extreme cold the following day, wore an extra upper coat, then another, and at length, in despair, took to his bed, which was continually heaped with blankets, which covered even his face, and in which he actually lay till his death, which did not happen until twenty years afterwards!

SONG.

They bid me forget thee, they tell me that now
The grave damp is staining thy beautiful brow:
They say that the sound of thy gay laugh is o'er:
Alas! shall I hear its sweet music no more?

I cannot forget thee, thy smile haunts me yet,
And thy deep earnest eyes, bright as when we first met;
Thy gay laugh returns in the silence of sleep,
And I start from my slumbers—to listen—and weep!

The spring of the desert in darkness flows on,
When the hand that has sealed its pure waters is gone;
And the eye of the stranger in vain seeks to know,
When the Arab's bright fountain is sparkling below.

So this fond heart has closed o'er the source of its tears,
O'er the love it has lived on, yet hidden for years;
Thou art gone, and another's rude hand shall in vain
Seek to bring that choked fountain to daylight again.

THE INFANT'S REST.

'Enter thou into thy rest.'

Poets describe their halcyon dreams,
Sailors covet the haven nearest,
Beauty exults in nature's beams;—
But the 'Infant's rest' is dearest.

There is a sleep of death—a flight
O'ertakes the swiftest and the surest;
But in the calm of sinless light
The 'Infant's Rest' is purest.

The camp is placed for a warrior's rest,
The fort is safest, strongest:—
The tomb lies o'er the monarch's breast,
Yet the 'Infant's Rest' is longest.

Time's weapons interrupt earth's peace,
Mortality life's links will sever,
Death breaks the chain and gives release,
Then the 'Infant Rests' for ever.

FACTS IN SCIENCE.

Relative Strength of Wood and other Bodies.

Iron	107
Brass	50
Bone	22
Box, Yew, Plumtree, Oak	11
Elm, Ash	8½
Walnut, Thorn	7½
Red Fir, Holly, Elder, Plane, Crabtree, and Appletree	7
Beech, Cherry, Hazel	6⅔
Lead	6½
Alder, Asp, Birch, White Fir, Willow	6

So that a good hempen rope of one inch circumference, will bear 1,000*lbs.* at most.
W. H.

To Make Red Ink.—Infuse a quarter of a pound of Brazil wood, rasped, in two pints of vinegar, for three days, then boil the liquid (still accompanied by the wood) over a gentle fire, for an hour, then strain it off whilst hot. Put it again over the fire and dissolve in it, first half an ounce of gum arabic, and afterwards half an ounce of alum and half an ounce of white sugar; when the alum is dissolved, remove it from the fire, and preserve it for use.

An illuminating gas is said to have been discovered at Birmingham, superior to all others, and obtained from water.

VARIETIES.

Echo at Westminster Bridge.—On the centre of Westminster Bridge a curious echo may be produced. If you go to one of the middle alcoves, and, putting your mouth close to the wall, speak in a whisper to a companion on the opposite side, after he has placed his ear close to the centre of the other alcove, he will hear every syllable you utter as distinctly as he would if you had both been in the gallery of St. Paul's.

Dr. Styles, in commenting on the perfidy of Judas in betraying his divine master, said 'the sop that he received was dipped in the lake of brimstone by the arch enemy of souls before he received it, that it might lull his conscience to sleep.' 'Well,' observed Hook, 'that was indeed a *sop-horrific!*'

The Glory of Law.—The following proof of the extent to which lawsuits may be carried, transpires in the course of the evidence given by an engineer before the Irish Survey Committee. He was asked—'Do not you think that, if questions arose upon property, the parties adjoining town lands would be able very accurately to define them?' He replied, 'I have had, on three occasions, something to do with disputed bog boundaries of town lands; and, in one instance, I remember 500*l.* being lost in a lawsuit for *one acre of bog.*'

Rabbinical Exposition of Scripture.—The Rabbies inform us that when Eve perceived by certain indications that, in consequence of eating the forbidden fruit, she must die, she determined that her husband should partake of the same; and said to him, 'If I am to die, you must die with me'—that she entreated and urged him to eat—that her solicitations being answered by repeated refusals, she tore off a branch of the tree, and belaboured him without mercy till he complied with her wish.

No Bad Rule.—'I never come late to a friend's dinner,' says Boileau, 'for I have observed that, when a company is waiting for a man, they make use of that time to load him with abuse.'

Etymology.—'Why are doctors called physicians, mamma?' said a little inquisitive girl to her mother, who had just been visited by one of them. 'Physician,' replied mamma, who was seldom at a loss for an answer, 'comes from fee-seek, as the doctors ride about all day to seek fees.'

The Gallant Butcher.—In the Bristol market, a lady laying her hand on a joint of veal, said, 'I think, Mr. F., this veal is not quite so white as usual.' 'Put on your *glove*, madam,' replied the dealer, 'and you will think differently.' It may be needless to remark, that the veal was ordered home without another word of objection.

Bartholomew Fair.—There were formerly three great fairs annually held in the metropolis, although Bartholomew is now the only one remaining; May Fair, which began on May-day, and continued for fourteen days, was partially suppressed in 1705, and entirely put down about fifty years ago; Southwark, or Lady Fair, which was held in September, and was of equal duration, has also been suppressed.

Bartholomew Fair is held under a grant of King Harry II., and confirmed by the charters of succeeding monarchs.

Fenelon and Louis XIV.—When Fenelon was almoner to the king, and attending Louis XIV. to a sermon preached by a Capuchin, he fell asleep. The Capuchin perceived it, and breaking off his discourse, said, 'Awake that sleeping abbé, who comes here only to pay his court to the king:' an anecdote which he often related with pleasure after he was Bishop of Cambray. At another time the king was astonished to find, instead of a numerous congregation in his chapel, only Fenelon and the priest. 'What is the reason of all this? said the king. 'I caused it to be given out, Sire,' replied Fenelon, 'that your majesty did not attend chapel to-day, that you might know who came to worship God, and who to flatter the king.'

TO CORRESPONDENTS.

We are obliged by the offer of J. T. B., but have no occasion to trouble him.

To R. C.,—Variety being always a leading object with us, we think we have pursued his subject far enough.

J. C. B.'s 'first effort' should encourage him to persevere; though we should not serve him by laying it before our Readers.

R. C. B., S. H., and many others, are received.

The double number of *The Casket*, containing the fullest particulars of the Coronation, is still on sale, embellished with the unprecedented number of *Twenty fine Engravings*, among which are the only *correct* representation yet published of the interior of the Abbey, engravings of the procession in carriages to the Abbey, on foot within the building, the whole of the Regalia, &c. &c.

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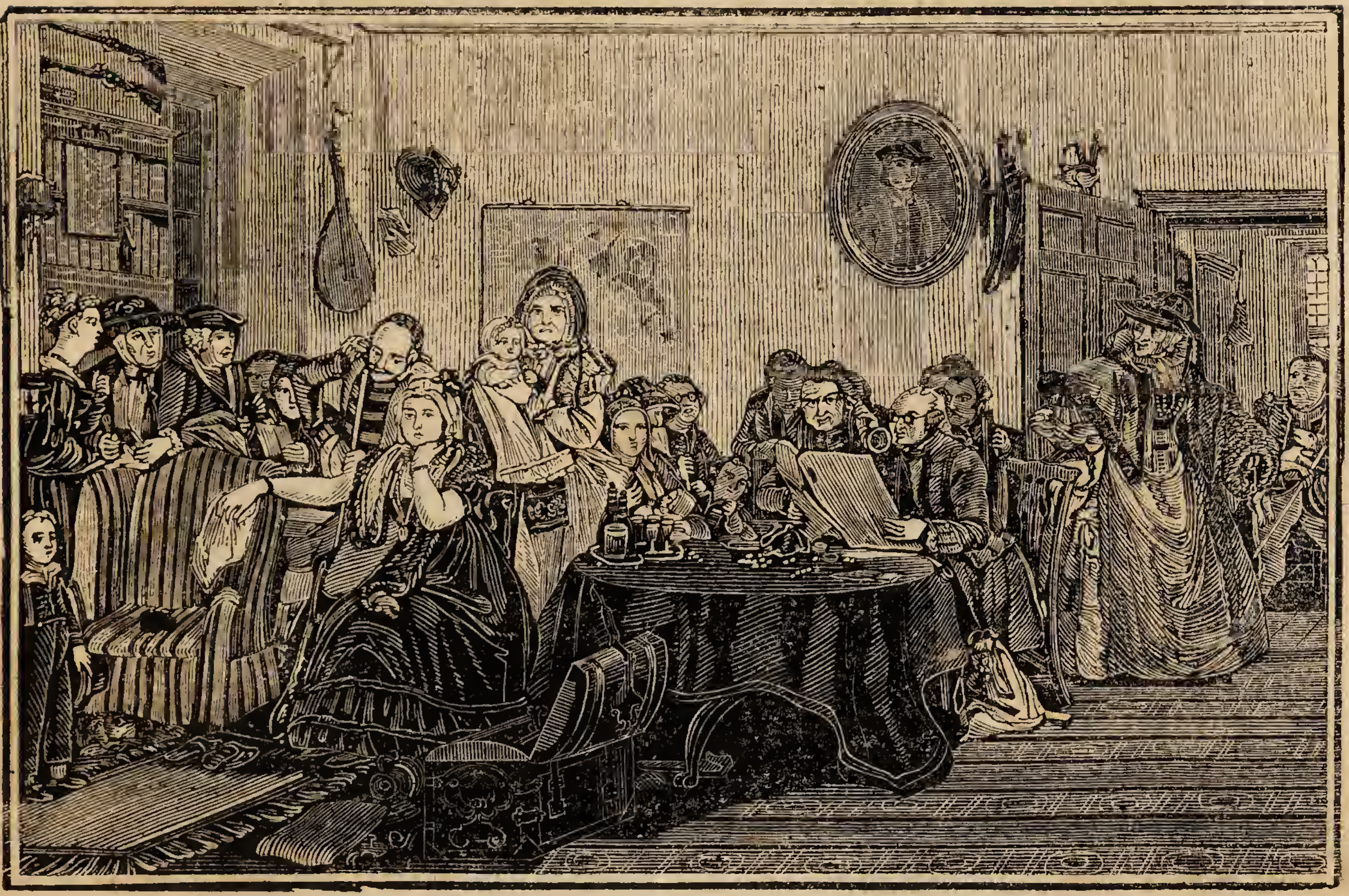
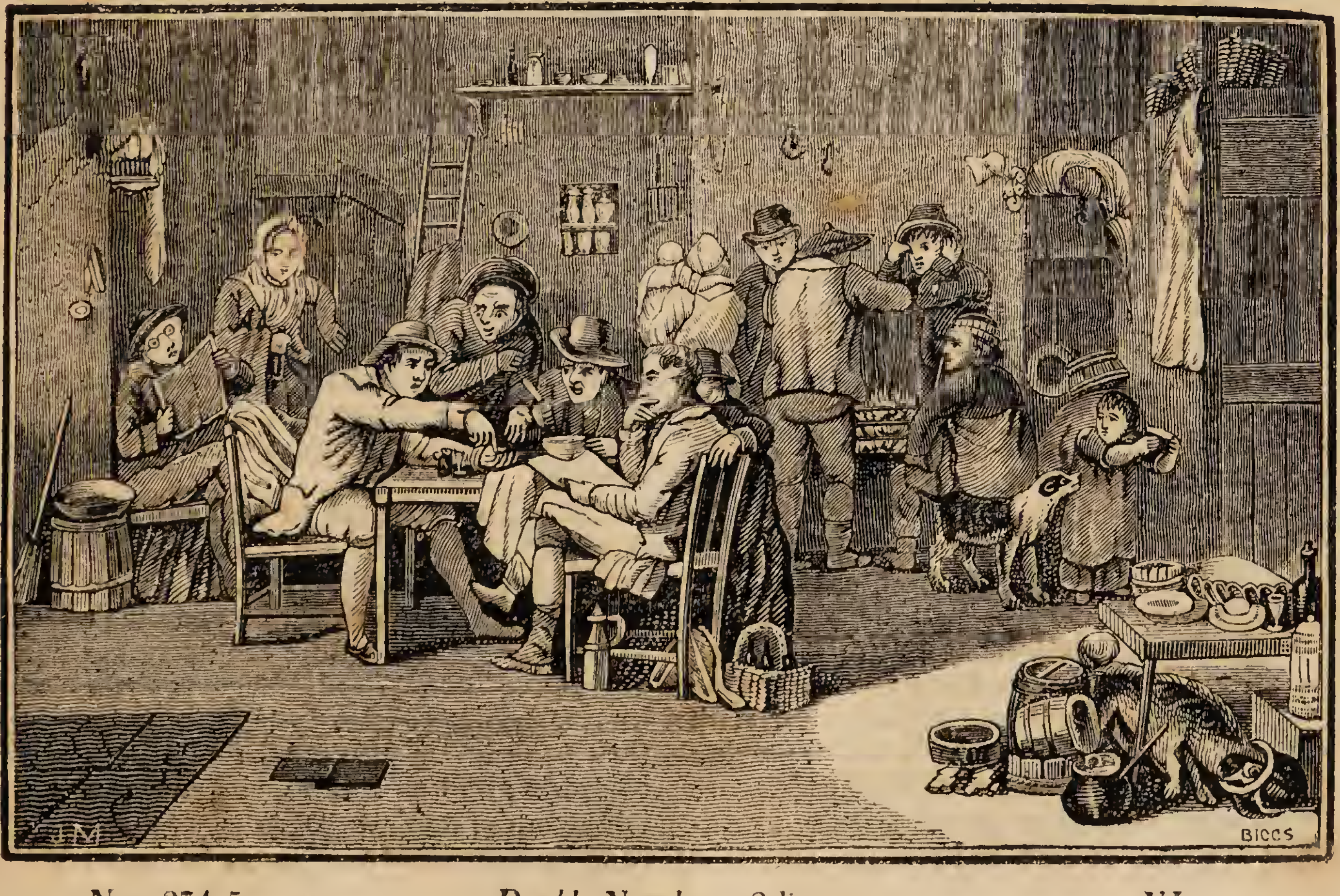
THE CASKET

OF LITERATURE, SCIENCE, AND ENTERTAINMENT.

THE READING OF THE WILL.



VILLAGE POLITICIANS.



Nos. 274-5. *Double Number—2d.* VI.

THE FORGERY.

A Tale founded on the Drama performing at the Adelphi Theatre.

Most dramatic tales have a marriage for their theme; but the piece lately produced at the Adelphi Theatre, under the title of The Forgery, and which derives much of its attraction from the accuracy with which two of Wilkie's pictures are delineated on the stage, commences with a death. William Neyland, an opulent tradesman, had been dead only a few days, and had left a young and lovely wife and two children.—John Neyland, his elder brother, by his father's first wife, was a man of a malicious designing mind, ever discontented, from an impression that he had been neglected by his parents, whilst his younger brother had been petted and helped forward in the world. This, however, was not the fact; but John Neyland had not the upright principle which marked the character of his brother in an eminent degree: he was lazy, and preferred living the life of a robber to gaining an honest livelihood. He had had frequent supplies of money from his brother, who had always treated him with as much kindness as his own ill behaviour would admit of, and had ever received him kindly at his house, when he chose to visit them.

William Neyland had arrived in London only about a week before his death (which happened suddenly, whilst he was returning thence), and had there met his brother, in company with an associate, who, to escape the obloquy his mode of life had brought upon his character, had assumed the name and dress of a Lieutenant Lizzard. This was the last time that John Neyland ever saw his brother alive. But a few days had elapsed since this meeting, when John Neyland determined to follow his brother to his home, and once more importune him for money. His surprise may be conceived when, on reaching the village where his brother had resided, he was informed that he was dead, and would be buried on the following day. He immediately sought the companion already alluded to, with whom he repaired to a neighbouring retired lane, that they might the more freely commune on the means of turning the recent catastrophe to their own advantage. However, by one of those inexplicable chances by which it seems to be the will of Providence to unveil the schemes of the wicked, notwithstanding all their precautions, they were overheard by a gentleman of the name of Thornhill, who had just returned from abroad, after an absence of five years, and who, whilst they were yet in the distance, recognized in them two men who had, a long time before, stabbed, robbed, and left him for dead. Knowing, as he did, their former propensities, he suspected that their conference had nothing commendable for its object; and he therefore concealed himself behind some bushes, in order to overhear what passed. The purport of their conversation was, that as William Neyland had doubtlessly left all his property to his wife and children, there were only two ways by which they could become possessed of it: either by forging a will, or by procuring the marriage of Lieutenant Lizzard with the widow; in which case he would obtain a husband's right to the property. The matrimonial project was, however, abandoned almost as soon as thought of, on account of the extreme improbability of the widow's ever acceding to proposals from a man of Lizzard's character. 'But,' said the latter, with regard to forging the will, 'how can that be managed? It must be signed.' 'It must,' replied Neyland, 'and by the lifeless hand of my brother. Ay—start not—you shall be the witness. I will to my brother's, and do you be under the window at midnight; I will assist you to enter at it, and a will shall be found that will place me above the world, and enable me to recompense you handsomely.'

Lizzard was about to leave, when Neyland called him back, saying—'I have a letter of my brother's, whereon is his signature; it must be your task to copy it—it will not be the first time you have committed forgery, you know,' continued he, jeeringly, as he thrust the letter into the hand of his comrade; 'we know you are an adept in the art.'—'Well, well, don't rake up old grievances,' said Lizzard, and, with mutual assurances of punctuality, they separated. Thornhill now emerged from his hiding-place—'Villains!' he exclaimed, 'little do ye think that any ears save your own have heard your diabolical plans; but I must not linger, or I shall miss ye—no, no, where ye go this night, there will I follow; and besides the witness which ye deem necessary to your plans, ye shall have one whom ye think is in his grave.'

We must here for a while leave the villains and their pursuer, to advert to the heart-broken widow and her children. They were sitting around a fire, in the apartment under the one in which lay the corpse. Mrs. Neyland was in a deep train of thought, which was only interrupted by her frequent bursts of grief, when a loud and hurried knocking was heard at the door. She sprang to her feet—'Who can that be?' said she, turning to her cousin Ellen, with an inquiring look.—'I'm sure I can't think,' said Ellen, 'unless it be that detestable John Neyland,—it was just his impatient knock.'—'I cannot see him to-night,' said Mrs. Neyland, 'I am too much fatigued, and shall have much to go through to-morrow;' so saying, she retired. Ellen opened the door, and John Neyland entered, grumbling that he had not been sooner admitted. 'Where is Mrs. Neyland?' he inquired.—'She has retired for the night, sir,' replied Ellen; then, pausing for a few minutes, she resumed—'You will not want me any longer, I suppose, sir; and you know the way to your own bedroom.'—'First bring some brandy, girl; and then you may leave me.' Ellen obeyed his orders, and Neyland was left to pursue his wicked purpose; he arose, and, having secured the doors, he cautiously opened the window, through which he assisted in pulling in Lizzard. 'Well, here we are, my boy, and now to work, lest our hearts should fail,' said Lizzard.—'Hush!' cried Neyland, 'you will disturb the house by your frivolity—listen to me. The widow has retired to bed, and has declined seeing me; so that we are free from interruption from her; and all that we have to do is to draw up a will to suit our purpose.' This was speedily done, and, as might be expected, was entirely in favour of themselves, leaving a mere trifle to the mother and children, and the bulk of the property to John Neyland, who was also appointed sole guardian to the children; which arrangement the surreptitious will described as having been adopted in consequence of the flighty and unfaithful conduct of the wife during the lifetime of the testator. The document was dated at the time and place of the last meeting of the brothers in London; for the guilty plotters well knew that, as William Neyland had not reached home alive, he was not likely to have executed any will subsequently to that period. 'Now,' said Neyland, 'nothing remains to be done but the signature. My brother lies in the room immediately over this—let us proceed thither.' They took the candle, and, having cautiously ascended the stairs, they entered the apartment of the dead. Neyland seemed for a moment paralyzed, but, making a sudden effort, he seized the will, and beckoned Lizzard to approach that he might witness the appalling scene. He then placed a pen in the hand of his dead brother, and, raising it to the paper, guided it in the making of the signature. But the act was witnessed by more than they expected or wished for. During the entire time they were in the lower apartment, Thornhill had been observing them from the window. As they quitted the room, he immediately entered, and, following them to the door of the bedchamber, he reached it just time enough to behold the forgery. ''Tis done,' exclaimed Neyland, as he sunk into a chair, almost fainting from the contemplation of his own iniquity; 'I shall to my chamber, but not to sleep.'—'And why not?' said his callous companion; 'come, come,—this is foolish,' and he hurried Neyland to his apartment.

Thornhill, as soon as he had seen the will signed, retreated to an inn, where he slept. On the following morning, while taking his breakfast, he took up the newspaper, when the first thing which met his view was an advertisement of the sale of his own estate, by the order of his executors; who, believing in his decease, were about to divide his property among his heirs. He immediately ordered his horse, and, having begged of the landlord to obtain for him all the particulars he could concerning the will and affairs of the deceased Mr. Neyland, he departed, saying, that he hoped to return in two days at the furthest.

On the morning of the funeral, John Neyland offered his services in receiving the mourners, which were declined by Mrs. Neyland. 'You need not be so haughty, madam,' said Neyland, as he eyed her with malicious contempt, 'your high head may yet be humbled; people have been known to have repented of their unkind behaviour, and to have made the only reparation in their power, by providing for them by means of a *will*.'—'John Neyland, what mean your taunts? no good to me, I'm sure—but remember, there is an especial curse for those who wrong the widow and the fatherless.' At this moment Lizzard entered, and Mrs. Neyland quitted the apartment. The funeral was at length over, and then came the critical moment—the reading of the will.

All those whom there was the slightest reason to suppose it might concern were present, and a will was read with the usual formalities, which bequeathed the use of all the property to the widow during her lifetime, and directed the principal to be divided amongst her children at her death. There was no mention of his brother, or any of his relatives. Mrs. Neyland was beloved by all who knew her, and, consequently, all rejoiced to find her so amply provided for. But there was one on whose countenance malice and disappointment shone conspicuously: it was John Neyland's. He rose from his seat, and, after a moment's pause, drew from his breast a document, which he desired the attorney to read. It was the forged will, which, as has already been stated, left him in the possession of all, save a mere trifle to the widow, and a small pittance to each of the children, of whom it appointed him guardian. Surprise and grief filled every mind, and the distracted widow in vain racked her brain to recollect how she had deserved such a punishment. 'Poverty,' said she, 'I could bear; but to be separated from my dear children—my only remaining comforts, I never can. Oh! my heart will break!' Staggering towards the monster who was the cause of her misery, she clasped his knees in an agony of grief, and, her utterance nearly stopped by her distraction, supplicated him to leave her her children. He retreated from her, and she fell. She was immediately conveyed to her chamber, but was not long allowed to remain there. Neyland summoned her to his presence, and, with a haughty air, required the children to be given up. On her knees she once more implored him; but he was deaf to her cries, and persisted in his claim to them. At this moment, Lizzard entered, and informed Neyland that the preparations were complete for removing the children from the house. In the moment occupied by Lizzard in saying thus much, Mrs. Neyland had seized the opportunity of speaking to her cousin, whom she conjured instantly to fly with her children to a neighbouring cottage.—Ellen understood her, and immediately conveyed them away.—'Now, madam,' said Neyland, turning to her, 'we are but waiting your pleasure.'—'Sir, I will to them instantly—only wait here a few moments;' and, with trembling steps, she hastily quitted the apartment and the house, not to fetch her children, but to protect and follow them; and, by the kind assistance of a neighbour, she succeeded in eluding all their searches.

Some weeks had passed away, when Thornhill, who had been detained at his seat longer than he had expected, entered the village, and inquired of the first peasant he met for the lodgings of Mrs. Neyland. This man happened to be the son of the person with whom she was living; he therefore conducted him to her immediately. On the same evening that Thornhill had returned to the village, Mrs. Neyland was arrested for twenty-one pounds, at the suit of a tallow-chandler, and was about to quit the cottage with the bailiffs and her little boy (who she begged might accompany her), to pass the night in a prison. Thornhill opportunely entered the apartment, and, on learning the unhappy condition of the widow, drew from his pocket some notes, paid the debt, and desired the bailiffs to quit the place. Mrs. Neyland threw herself at the feet of Thornhill—'Oh! my kind preserver,' she exclaimed, 'tell me to whom I am indebted for my liberty! Kneel, my child, and, with your mother, let your latest breath be spent in blessing our deliverer!' In this position were they when John Neyland and his companion, whom Thornhill had purposely caused to be informed of the dwelling of Mrs. Neyland, rushed into the cottage, eager to wring the heart of the oppressed widow by forcing her children from her. The instant their eyes met Thornhill's, they simultaneously started, as though they beheld a phantom. As soon as they had somewhat recovered from their consternation, they would have retreated; but Thornhill prevented them. 'Think not,' said he, 'that you shall longer revel in your ill-gotten wealth! Villains, listen:—The man whom you thought you murdered in Paris, some six years ago, recovered, and returned to his native country just in time to witness your horrid crime. In the lane I overheard your conversation. I followed you to the house and to the apartment in which your dead brother lay. There I was concealed, almost close behind you, when, with his dead hand, you signed a forged will. If you can and *dare* deny this, you are at liberty to do so.'

Mrs. Neyland was struck with amazement. 'Is it possible?' said she,—'can it be true?—or am I but dreaming?' 'Lady,' said Thornhill, as he took her hand in his, 'believe me, 'tis no dream; and may you long live in happiness with your children!'—He then delivered Neyland and his associate into the hands of justice; and the widow would again have loaded her preserver with thanks, but he gently requested her to desist; observing that he had but done his duty, and that the happiness he should experience in having been instrumental to their comfort, would amply reward him through life.

THE BRACELETS.

(*Concluded from No.* 273., *p.* 79.)

'WAITING—and for my arrival?—Impossible!—You are all wrong, fellows! I am not he whom you suppose me! I am mistaken for some one else—and he must be nothing particular, seeing I, through being mistaken for him, was kidnapped away! Harkee, sirrahs—do you understand?' The servants looked at one another in silence, and without a smile. 'Do you know who I am?' continued Carl in a louder key—but in vain; he received no answer.

'Where will all this mummery end?' thought Carl, pouring out, mechanically, another cup of wine. The thought suddenly struck him, and the more he entertained it, the more probable it appeared—that, after all, the whole of his evening's adventures might be the contrivance of one of those celebrated and systematic hoaxers, of whom, in Italy, the illustrious Lorenzo was chief. Every occurrence of the evening seemed easily explicable on this hypothesis—but one; the general uproar in the streets of Goettingen at the period of his leaving. While he was turning about these thoughts in his mind, one of the servants opened a door and stood by it, as if hinting that Carl should rise from table and follow. Resolved patiently to await the issue, he arose, and walked towards the door. He was conducted up an ample staircase, leading to a lofty hall, supported by marble pillars. After traversing it in silence, his conductors opened a pair of large folding-doors, and ushered Carl through them—gently closed the high doors upon him, and retired. Carl now found himself in an apartment equally magnificent with the one he had left. Still, however, there was not—as in the other—artificial light; but the room was, so to speak, flooded with a radiant tide of moonlight. Every thing about him, to Carl's disturbed apprehension, wore the air of mystery and romance. Whichever way he looked, there was a dim and dreary splendour which transcended the creatures of poetry. Almost the whole extent of the further extremity of the chamber consisted of a large gothic-fashioned window, with a door in the centre of it, opening upon a narrow slip of shrubbery or terrace. The prospect through this window was glorious. The moon was still—

'Riding at her highest noon,'

like a bright bark over a sea of sapphire, scattering her splendour over streams glittering like veins of silver amid a noble extent of champaign country.—But the most marvellous circumstance of the whole was the disappearance of the snow he had so lately seen. Was it possible—thought Carl, pressing his hand to his forehead—that he had slept through an interval of twenty-four hours since he saw the snow? Had he taken drugged draughts at supper, and but now awoke, unconscious of the interval that had elapsed? This extraordinary absence of snow was, as already said, the first thing observed by Carl, hurried as was his glance; but ere long a very different object, within the chamber, arrested his attention, absorbing every faculty in mute astonishment and admiration. At the upper extremity of the chamber the resplendent moonbeam fell on the figure of a lady, white as snow, reclining on a couch, with her head supported by her arm. Never before had Carl beheld, even in dreams, a vision of such dazzling beauty. So perfectly symmetrical her features, so delicately moulded her figure, so gracefully negligent her attitude, and so motionless withal, that Carl, as he glided slowly towards her, his eyes and hands elevated with rapturous astonishment, began to suspect he was mocked by some surpassing specimen of the statuary's art. As he drew nearer, he perceived that the lady was asleep—at least her head drooped a little, and her eyes were closed. He stood within a few paces of her. What with gazing on the lovely recumbent, and the generous potency of the wine he had been drinking, Carl felt himself, as it were, under a new influence. Fear and doubt had passed away. He fell softly on his knees before the beautiful incognita. Her features moved not.

He thought however, after steadfastly eyeing her, that he perceived a slow heaving of the bosom, as though she strove to conceal the breath she drew. Intoxicated with his feelings, Carl could continue silent no longer.

'Oh, lady, if mortal you be—oh, lady, I die at your feet!' stammered Carl, with a fluttering heart.

'Carl, where have you been? You cannot—no, you cannot love me, or you would not have delayed so long!' replied the lady, in a gentle tone, and with a glance 'fuller of speech unto the heart than aught utterable by man.' What dazzling eyes were fixed upon the sinking student!

'I would to Heaven,' he stammered, 'I might believe you—loved me; but—but—lady'——

'*But* what?—Ah, Carl! do you doubt me?' inquired the lady, gazing at him with an eye of anxious tenderness. Carl's tongue refused him utterance for some moments, and he trembled from head to foot.

'How, fair one, can you say you love one you know not? Me you know not——'

'Not know you!—Oh, Carl, Carl!' and she looked at him with a reproachful smile. The student stared at her in silence.

'Lady, I am bewildered! I know not where I am, nor how I came hither! Yet blessed be Heaven that I have thus seen you. I could die with your image in my eye! It would pass me to heaven! Oh, forgive me, lady, knowing that I rave! Your beauty maddens me! I sink—I die beneath it! I know not, nor can control, what my tongue utters. The only thing I know is, that I am unworthy of you——' gasped Carl, dropping his head upon his bosom.

'Then, Carl, is my love for you the greater, seeing it can overlook all unworthiness! But, dear Carl, why speak I thus? You are not unworthy—no, no! You are of great wit—graceful, noble—in a word, I——'

'Speak, lady! speak, speak! Delay not!—I faint—I die!' murmured the impassioned student.

'Well, I love you, Carl! I have long loved you, since first my eye fell on you. Pardon the scheme——' Here the lady became inarticulate with agitation. A long pause of mutual trepidation and embarrassment ensued. Each cast but furtive glances at the other; the conscious colour went and came alternately, in the cheeks of either.

Carl, still bending on his knee, gently strove to disentangle the hand which lay concealed beneath the folds of her veil. He succeeded, feeble as was the force he used; but the hand was still enveloped in the folds of a long white glove.

'May I not kiss these fair fingers but through a glove?' inquired Carl, fondly, and with returning self-possession.

'Why, you are truly of a sudden grown chivalrous as an old knight,' replied the lady, in a tone of subdued gaiety; 'but since such is your ambitious fancy, why should I refuse you so small a favour, who can refuse you nothing? So, here is my right hand, sir knight. What wouldst thou?'

She disengaged the hand on which her head had been leaning, and gave it to Carl, who smothered the taper fingers with kisses. Infatuated with sudden unaccountable passion, Carl, in a sort of frenzy, started from his knee, threw his arm around the sylph-like figure of the lady, and imprinted a long, clinging, half-returned kiss upon her soft lips!

He had neither time nor inclination to reflect on what he was doing—on the unaccountable freedom of his behaviour to a lady evidently of the highest consideration, with whom he had had—and that in the most unsatisfactory and mysterious manner—only a few minutes' acquaintance. He forgot all his harrowing suspicions of Inquisitorial *diablerie*. Everything merged into his intense consciousness of present pleasure. He yielded to the irresistible impulse of his feelings, blind and indifferent to consequences.

''Tis all owing to the wine I drunk in the supper-room!' thought Carl; but, alas! how little did he know of the important events with which he had got extraodinarily implicated; of the principle and subtle influence which was at work preparing for him scenes of future change and suffering!

A few minutes' time beheld Carl pacing slowly up and down the spacious chamber, supporting his beautiful and mysterious companion, watching with ecstasy her graceful motions, and pouring into her ear the impassioned accents of love; not, however, without an occasional flightiness of manner, which he could neither check nor disguise. When he listened to the dulcet melody of her voice, which fell on his ear like the breathings of an Æolian harp; when he observed her dove-like eyes fixed fondly upon him; and felt the faint throbbings of her heart against the hand that supported her, he almost lost all consciousness of treading among the lower realities of life.

Whilst Carl was thus delightfully occupied, his companion suddenly turned aside her head, and to Carl's amazement and alarm, burst into a flood of tears. Burying her face in the folds of her veil, she began to weep bitterly. 'For mercy's sake, dear lady, tell me what ails you?' inquired the startled student. He repeated his question; but in vain. His reiterated questions called forth no other answer than sobs and tears.

'Lady! dear, beloved lady—why are you bent on breaking my heart? Have I then so soon grown unworthy in your eyes?' again inquired Carl, a little relaxing the arm that supported her, as though grieved and mortified at her reserve.

'Oh, Carl, Carl! indeed you are most worthy of my love, of all my confidence; but you cannot help me! No, no—I am undone!—lost, lost, lost, for ever!' replied the lady, in heart-breaking accents.

Carl begged, intreated, implored, to be made acquainted with the cause of her agitation, but in vain. His thoughts (alas! what is man?) began to travel rapidly from 'beauty in tears,' to 'beauty in sullens;' and commiseration was freezing fast into something like anger, or rather contempt.

'Lady, if you think me thus unworthy to share your grief—to be apprized of its source—that so I may acquit myself, I—I—I cannot stay to see you in sufferings I may not alleviate; I must—yes, I must leave you, lady—if it even break my heart!' said Carl, with as much firmness as he could muster. She turned towards him an eye that instantly melted away all his displeasure—a soft blue eye glistening through the dews of sorrow—and swooned in his arms.

Was ever mortal so situated as Carl, at that agitating moment? Inexpressibly shocked, he bore his lovely, but insensible burden to the window; and thinking fresh air might revive her, he carried her through the door, which opened on the narrow terrace, as before mentioned. While supporting her in his arms, and against his shaking knees, and parting her luxuriant hair from her damp forehead, he unconsciously dropped a tear upon her pallid features. She revived. She smiled with sad sweetness on her agitated supporter, with slowly returning consciousness, and passed her soft fingers gently over his forehead. As soon as her strength returned, Carl led her gently a few paces to and fro on the terrace, thinking the exercise might fully restore her. The terrace overlooked, at a height of about sixty feet, an extensive and beautifully disposed garden; and both Carl and his mysterious companion paused a few moments to view a fountain underneath, which threw out its clear waters in the moonlight, like sparkling showers of crystal. How tranquil and beautiful was all before them! While Carl's eye was passing rapidly over the various objects before him, he perceived his companion suddenly start. Concern and agitation were again visible in her features. She seemed on the point of bursting a second time into tears, when Carl, once more, with affectionate earnestness, besought her to keep him no longer in torturing suspense, but acquaint him with the source of her sorrows.

'Lady, once more I implore you to tell me whence all this agony?' She eyed him steadfastly and mournfully, and replied, 'A loss, dear Carl—a fearful—an irreparable loss.'

'In the name of mercy, lady, what loss can merit such dreadful names?'

'It is a loss, Carl, the effects of which scarce befits mortal lips to tell. It were little to say, that unless it be recovered, a crowned head must be brought low!' She shuddered from head to foot. Carl's blood began to trickle coldly through his veins, and he stood gazing at his companion with terrified anxiety.

'Carl!' continued the lady, in a scarcely audible murmur, 'I have been told to-day—how shall I breathe it!—by one from the grave, that you were destined to restore to me what I have lost—that you were Heaven's chosen instrument—that you alone, of other men, had rightly studied the laws of spiritual being—could command the services of evil spirits,' she continued, fixing a startling glance on Carl, who quailed under it.

'Lady, pardon me for saying it is false, if it has been so slanderously reported to you of me; ay, false as the lips of Satan! I know naught of spirits—naught of hereafter, but through the blessed Bible,' replied Carl, in hurried accents, a cold perspiration suddenly bedewing him from head to foot. His feelings began to revolt—to recoil from his companion—whom he could not help suddenly likening to the beautiful serpent that beguiled Eve; but she twined her arms closely around him, and almost groaned in heart-moving accents, 'Oh, Carl, Carl! that I might but tell you what I have heard of you, or rather what I know of you!'

There had been something very terrible in her demeanour, latterly. She seemed speaking as if of set purpose, and her eye was ever alive, probing Carl's soul to see the effect of what she uttered. At least so Carl thought. All his apprehensions about the hideous Inquisition revived, and with tenfold force. Was this subtle and beautiful being one of their creatures? A fiend, cunningly tutored to extract his soul's secret, and then betray him into the fiery grasp of torture and death?

It was long before he could speak to her. At length he exclaimed, 'For mercy's sake, lady, tell me what frightful meaning lurks beneath what you say? What is your loss? What do you know, or have heard, of me? Tell me, though I should expire with terror!'

'Can you, then, bear a secret to the grave, unspoken?' she inquired, gazing at him with an expression of melancholy and mysterious awe.

'*Did Thurialma appear again?*'

The student turned ghastly pale, and almost dropped her from his arms.

'I know not what your words mean,' stammered Carl, almost swooning. His companion's eye was fixed on him with wellnigh petrifying effect.

'Carl,' said she, in a low tone, 'I am about to tell you the source of my sorrows—that is, my loss. There is none near, to overhear us?' she inquired, faintly, without removing her eyes from Carl's.

'None! none!' murmured the student, a mist clouding his eyes; for, at the moment of his companion's uttering the words last mentioned, he had distinctly seen a human face peering over the edge of the terrace. He shook like an aspen-leaf, shivering under the midnight wind.

'What have you lost?' he inquired.

'The fellow to this,' replied the lady, drawing off the glove from her left hand, and disclosing a bracelet the very counterpart of that in Carl's possession. His brain reeled;—he felt choked.

'What—what of him—that—hath its fellow?' he faltered, sinking on one knee, unable to sustain the burden of his companion.

'He is either a sorcerer, a prince, or a murderer!' replied the lady, in a hollow broken tone.

Carl slowly bared his shaking arm, and disclosed the bracelet gleaming on his wrist. He felt that in another moment he must sink senseless to the earth; but the lady, after glaring at the bracelet, with a half-suppressed shriek, and an expanding eye of glassy horror, suddenly sprung from him, and fell headlong over the terrace, at the very edge of which they had been standing.

'Ha!—accursed, damned traitor!' yelled a voice close behind him, followed by a peal of hideous laughter. He turned staggeringly towards the quarter from which the sounds came, and beheld the old man who had given him the bracelet, and now stood close at his elbow, glaring at him with the eye of a demon, his hands stretched out, his fingers curved like the cruel claws of a tiger, and his feet planted in the earth as if with convulsive effort.

'Thrice accursed wretch!' repeated the old man in a voice of thunder; 'what have you done? Did not her highness tell you who you were?'

'Tell me!—what?'

The old man suddenly clasped Carl by the wrist covered with the bracelet; his features dilated with fiendish fury; his eyes, full of horrible lustre, glanced from Carl to the precipice, and from the precipice to Carl.

'Tell me!—what?' again gasped the student, half dead with fright, striving in vain to recede from the edge of the terrace. The hand with which the old man clasped Carl's wrist quivered with fierce emotion.

'Tell me'—once more murmured Carl—'what did she say?'

'Baa!' roared his tormentor, at the same time letting go Carl's wrist, and, slipping over the edge of the terrace, he was out of sight in an instant—leaving Carl Koëcker *broad awake*, and in darkness, for he had broken his lamp, and overthrown both chair and table. His fire had gone out to the last cinder, and a ray or two of misty twilight, struggling through the crevices of the window-shutters, served to show him how long he had been dreaming.

He groped his way to bed, shivering with cold, and execrating the opera he had recently witnessed, whose ill-assorted recollections, with other passing fancies, had been moulded into so singular and distressing a dream. Q. Q. Q.

THE SONGSTER'S CASKET.

THE HUNTER'S SERENADE.

By W. C. Bryant, an American Poet.

Thy bower is finished, fairest!
  Fit bower for hunter's bride—
Where old woods overshadow
  The green savannah's side.
I've wandered long and wander'd far,
  And never have I met,
In all this lovely western land,
  A spot so lovely yet.
But I shall think it fairer
  When thou art come to bless,
With thy sweet eyes and silver voice,
  Its silent loveliness.

For thee the wild grape glistens
  On sunny knoll and tree,
And stoops the slim papaya
  With yellow fruit for thee;
For thee the duck on glassy stream,
  The prairie-fowl, shall die,
My rifle for thy feast shall bring
  The wild swan from the sky;
The forest's leaping panther,
  Fierce, beautiful, and fleet,
Shall yield his spotted hide to be
  A carpet for thy feet.

I know, for thou hast told me,
  Thy maiden love of flowers;
Ah! those that deck thy gardens
  Are pale compared with ours.

When our wide woods and mighty lawns
  Bloom to the April skies,
The earth has no more gorgeous sight
  To show to human eyes.
In meadows red with blossoms,
  All summer long, the bee
Murmurs, and loads his yellow thighs,
  For thee, my love, and me.

Or, wouldst thou gaze at tokens
  Of ages long ago?
Our old oaks stream with mosses,
  And sprout with mistletoe;
And mighty vines, like serpents, climb
  The giant sycamore;
And trunks, o'erthrown for centuries,
  Cumber the forest floor;
And in the great savannah
  The solitary mound,
Built by the elder world, o'erlooks
  The loneliness around.

Come, thou hast not forgotten
  Thy pledge and promise quite,
With many blushes murmured,
  Beneath the evening light.
Come, the young violets crowd my door,
  Thy earliest look to win,
And at my silent window-sill
  The jessamine peeps in;
All day the redbreast warbles
  Upon the mulberry near,
And the night-sparrow trills her song
  All night, with none to hear.

LOVE'S RITORNELLA.

Gentle Zitella, whither away?
Love's ritornella, list while I play.
No, I have linger'd too long on the road,—
Night is advancing, the brigand's abroad.
Lovely Zitella has too much to fear,
Love's ritornella she may not hear.

Charming Zitella, why shouldst thou care?
Night is not darker than thy raven hair!
And those starry eyes if the brigand should see,
Thou art the robber, the captive is he.
Gentle Zitella, banish thy fear,
Love's ritornella tarry and hear.

Simple Zitella, beware, oh! beware,
List ye no ditty, grant ye no prayer:
To thy light footsteps let terror add wings—
'Tis Massaroni himself who now sings.
Gentle Zitella, banish thy fear,
Love's ritornella tarry and hear.

CHILD OF THE WEST.

BY F. W. N. BAYLEY.

The Music, by G. A. Hodson, published by Goulding and D'Almaine.

Fair chiel of the west, will ye gang wi' me,
  And dance on the highland hill,
Where the piper's merrie minstrelsie
  Flows on like a rushing rill;
Where the bonnie thistle rears its head,
  And nods to the purple heather.
Fair chiel of the west, will ye gang wi' me?
  And we'll dance o'er the highlands together.

Fair chiel, gin the snaw fa' white and fast,
  When the winter tempest lowers,
And my winsome girl to the northern blast,
  Like a drooping lily, cowers,
I've a canny cot by the blue hill-side—
  Love flies there in stormy weather,
And gin ye will tak it and be my bride,
  We'll live in the highlands together.

Look awa to the north, lovely chiel o' the west,
  And see where the white mist gathers,
Like the spirit of song, in its shadowy vest,
  When it hung o'er the harps of my fathers;
When auld winter is gone—o'er the hills it
    will fling
  The dew that still freshens the heather:
Then we'll gang out, loved lassie, to meet the
    fair spring,
  And we'll dance o'er the highlands together.

THE RENT-DAY.

(Concluded from No. 274., p. 76.)

It will be recollected, that when the distrain was made in Martin's house, he rushed from it in a fit of frantic despair. For awhile, he wandered about without any settled purpose; but at length, as a last hope, he resolved to proceed to the hall, and make another attempt to awaken the sympathy of the steward. Having reached the house after the thieves had unfastened the doors, he, also, entered unobstructed at this momentous crisis. The first persons he encountered were Silver Jack and Hyssop. It at once struck the former that he might incite Martin to murder the stranger, and thus enable them to rifle his person without actually spilling his blood themselves, by communicating the presence of his wife in the stranger's room in such a way as to excite his jealousy. — 'Well, Master Martin,' said he, 'I suppose you come in quest of your wife. She is in that apartment, with the gentleman who is staying here.' 'My wife!' replied Martin: 'villain, thou liest!' 'Nay, good sir,' said Jack, 'take not my word, but convince yourself;—knock, and she will doubtless admit you herself.' Martin, almost frantic, did as he was desired; and—fatal sight!—he beheld his wife—her whom he had adored—had worshipped!—The stranger followed her from the room. Martin, who had had a pistol put into his hands by the robbers, presented it at him, when Rachel threw herself before the gentleman. 'What!' exclaimed Martin, 'cling to him before my eyes!—Rachel Heywood, I forgive that man, and will even thank him, if he will send a bullet through the heart you have broken!' 'This your husband, and leagued with the robbers?' said the stranger, addressing Rachel. 'No! no!' replied she, 'it cannot be so; but grief has distracted him!'—'Yes,' said Martin, sorrowfully, 'falsehood, scorn, and shame, where I had hoped for truth and love, and had built my greatest pride!'—'Go,' said the stranger; 'for your attempt to shoot me, I pardon you —I spare you.' Martin sorrowfully replied—'I have at home four motherless children—will you spare me them? will you leave me that miserable comfort?' Rachel threw herself at his knees, but Martin was too frantic to be reasoned with, and rushed from the house. During this scene the robbers had contrived to effect their escape. The steward, in the conviction that the knowledge which Jack and Hyssop had of his former mode of life, would ultimately end in his exposure, had collected all the money and valuables which he could scrape together, and was about to take his departure—as he thought—before the inmates were stirring, when the servants who had been sent in pursuit of the robbers discovered, under a hedge near the mansion, a box, containing all the things with which Crumbs had intended to decamp. They justly concluded that the robber, whoever he might be, would return to take possession of the plunder; and they accordingly watched the spot in concealment. Their surprise may well be imagined when the steward presented himself. They seized him in the act, and conveyed him to the mansion.

Martin had returned to his home, and, seated in an arm-chair, with his children grouped about him, he spoke as follows:—'This, then, is the end! all I was worth is gone, and with them all hope of better days; labour will now indeed be hard, for I shall toil with a broken heart. Fortune now cannot bless me, for she with whom I should have shared my fate has shamed me—and—but I cannot curse her with her children around me! I must leave the place where I was born—' The sound of Rachel's voice calling on his name struck upon his ear; he started, and desired the children instantly to bolt the door. 'What! against our mother?' they all exclaimed, 'no, we must not do that.'—'You are right,' said Martin, 'you must not.' Rachel hastily entered the apartment, and, looking wildly around, she fell on her knees, exclaiming—'Martin! dear Martin! hear me.'—'If you can look at me and not sink with shame, how can you look at your children?'—'Shame!' ejaculated Rachel, 'indeed, Martin, you are deceived.'—'I have been so deceived that, had an angel told me what I myself beheld, I would not have believed.'—'If you ever loved me, Martin, hear me; and then judge me as you will. The villain who remained here in possession of the property, when you fled and left me unprotected, tempted me with gold, and would have insulted me; but I fled from him, and, in my flight, I overheard a foul plan of murder. I flew to the mansion, to inform the stranger of it.'—'And I found you coming from his chamber,' said Martin, angrily.—''Twas but to save his life that I went there—it is the truth, Martin, believe me.'

At this moment a sailor entered, and informed Martin that in an hour he should be ready to depart. Rachel was surprised: 'Ay, Rachel,' said Martin, 'I have accepted a place abroad, to overlook slaves.'—'And the children—'—'They will go, too.' —'And I, Martin, I?'—'Go where you like—may you be happy!'—'Oh, Martin! use me as you please, but do not separate me from my children; if it must be so, do not regard me as your wife, but as one of the slaves you go to govern!'—'Rachel, this is folly: take your leave of them—they must go.'—'Oh! my children, pray for me,—pray to him I must not call husband. I shall go mad!—Oh! let me die, so it be with you and them!' —She became exhausted; the conflict was more than her delicate frame could support, and she sank at Martin's feet.

Some of the neighbours, who had heard of Martin's intention to leave them, now came in to learn the truth: 'Yes, neighbours, farewell—heaven bless you all. The landlord may take all, except this chair of my grandfather's—that I take with me.' To this, however, Bullfrog interposed an objection, asserting that he must not remove a splinter of it. 'This chair, I say, I take with me; and let he who dares prevent me.' Bullfrog immediately seized it, and Martin, in forcing it from him, broke off the back, when, to the amazement of all assembled, a quantity of loose gold and small bags of money, together with a paper, fell from it. As soon as they had somewhat recovered from their surprise, Farmer Beanstalk read the paper, which was as follows:—'This is to certify (should I die suddenly) that the three hundred guineas hidden with this paper, in the walnut chair, be the rightful property of Martin and Tobias Heywood, my grandsons.' (Signed) 'Thomas Heywood.' The neighbours shouted their joy, and Martin, after an interval of intense agitation, vociferated in exultation—'I shall keep the farm! I shall keep the farm!'

The stranger who had been at the mansion now entered, and inquired for Martin Heywood. 'Come not here, man,' said Martin, composedly. 'Sir, I come but to confess that I had thought you the companion of scoundrels; and that, from what I have heard of you from your neighbours, I am convinced of the contrary. Had it not been for your wife, I might have fallen a victim to the robbers; but she came to save me.' — Here he was interrupted by the entrance of Toby Heywood, carrying a box, and dragging after him the steward, Crumbs. 'That box,' said Toby, 'we found under the laurel-hedge; and, after waiting some time, we captured the thief, who had come to bear away his prize, and here he is.'—'Well, sirrah!' said the stranger, 'what answer can you give to this?'—'None to you, sir! To Robert Grantley I can give a clear one.'—'Then give it now—Robert Grantley stands before you. I had heard of your oppression, and, having written to you for more money (which it was your duty to have refused to supply), I came here disguised, to witness the manner in which you would procure it.' — 'Robert Grantley, since you are here, listen:—You observed a picture of a female at the mansion: that was the portrait of a once young and amiable wife; but a devil, a golden devil, seduced her, and she left an adoring husband and disgraced him. Years passed away, and in a foreign land he met the destroyer of his wife; who, not knowing the man he had injured, fostered him, took him into his confidence, and brought him to England. He died, and left him to manage his estate for his absent son. Robert Grantley, that man was your father—the portrait, that of his victim! I—I was her broken-hearted husband.'—'Can it be?' said Grantley, scarcely willing to credit what he heard. Crumbs resumed—'My intention was to have revenged my wrongs, by leaving you a beggar—but enough—I am ready for my gaol.'—'No!' exclaimed Grantley, 'your injuries were great—I pardon, and will provide for you.' — 'Never!' replied Crumbs, proudly: 'I scorn—I spit at you; but say, am I free?'—Grantley bowed assent, and Crumbs was about to depart, when Silver Jack and Hyssop, who had been found sheep-stealing, were brought into the farm-house. 'Here,' said the servants, addressing themselves to Grantley, 'are the thieves who had intended to have robbed you. We knew where you were, and have therefore brought them here: this paper we took from one of their pockets.'—'What is this?' inquired Grantley, as he opened the bill, and read as follows:—'Escaped from Newgate, John Harris! what can this mean?'—'It means,' replied Crumbs, 'the man your father robbed. I took ten guineas from a rich usurer, and was condemned to be hanged; he stole the wife of my bosom, and lived a wealthy charitable gentleman.—May I leave you now?' Grantley assented, and Crumbs retired. Jack and Hyssop were allowed to follow. 'Ay,' said Toby, 'those two deserve hanging. Why! they were just now boasting how they had made my ninny of a brother jealous.' — 'I thought,' said Toby to Martin, 'you had more sense than to have suspected Rachel on the testimony of such fellows as these.'—'Well,' said Martin, approaching his wife, 'can you forgive me, Rachel? I scarcely dare look at you.' Rachel only answered by throwing herself into her husband's arms. 'And now,' continued Martin, turning to Grantley, 'can you forgive the passion of an oppressed —'—'Nay,' said Grantley, interrupting him, 'it is I who have to ask pardon of all my tenants, for having so long subjected them to the will of a mercenary agent.' Then, addressing himself to Heywood, he said—'To your wife I probably owe my existence—this farm has, I hear, been in your family for 60 years; may it remain so while the country stands! to-morrow you shall have the assignment of a freehold for ever.' The neighbours with one accord thanked him for his kindness to Martin Heywood; joy was on all their countenances; and the remainder of the day was passed in the most heartfelt hilarity and merriment.

[We have a fine engraving of the 'Distraining for Rent' in preparation; but, in order to give together the two engravings required to embellish Mr. Buckstone's popular new drama at the Adelphi Theatre, we have been obliged to defer its insertion for the present.

* * *

ANECDOTES OF ROWLAND HILL.

It is related that once, while his wife was siting in her pew, he pointed her out as a living illustration of the transitory nature of female beauty, commenting in very homely terms on the change which years had made in her appearance.

'Ladies,' said he, on another occasion, 'love fine caps; so does Mrs. Hill. Yesterday came home a five-guinea one; but she will never wear it, for I poked it into the fire, band-box and all! One Sunday morning, just as she was entering the chapel, he exclaimed, 'Here comes my wife with a chest of drawers on her head! She went out to buy them, and spent all her money on that hoity-toity bonnet!' 'Charity, my brethren,' said he in a discourse which he preached in aid of a benevolent institution, at Wapping, 'charity covereth a multitude of sins; and you have need to be charitable, for you are all sinners, and some of you are *whopping* sinners.'

As much singularity has been attributed to him in private life as in the pulpit. Hearing a dispute between two of his servants, as to which of them should wash his hall, each of them declaring 'that it was not her business,' he sent them both out on errands, and assumed the mop himself. On their return, they warmly protested against his being engaged in so menial a task. 'Pho, pho!' said he, ''tis not your business, Peggy; nor your's either, Jane; so it must be mine, I suppose.'

Some of his numberless benevolent actions are described as being tinged with that eccentricity which pervades the whole of his conduct. While visiting the sick on one occasion, in the neighbourhood of his residence, he found a poor emaciated creature, stretched on a miserable bed in a garret, and without a shirt; the kind-hearted divine immediately stripped, and forced his own upon the reluctant invalid; for whom he speedily procured a supply of other necessaries, and the assistance of a medical man, who soon restored the patient to health.

One night, after he had been in bed for some hours, he felt an impulse to get up and take a walk. Wandering into the Strand, he was there accosted by an unfortunate woman, with whom he entered into conversation; and, finding her, as he thought, weary of her evil course of life, and inclined to repent, he took her to his house, and prevailed upon Mrs. Hill to receive her as a domestic. A similar anecdote has been recorded of the celebrated Burke.

Being robbed by a footpad, whose agitation of manner excited his interest, he asked him how long he had followed the perilous trade of a robber: 'This is my first offence,' replied the man; 'extreme distress has driven me to it; I have a wife and children in a state of starvation.' 'If what you state be true,' said the divine, after mentioning his name, 'you need not fear to call upon me to-morrow.' On the following day, the man presented himself to Mr. Hill, who thought proper to take him into his service, at the same time declaring that he would never divulge the circumstances of their first meeting until the death of the offender. He faithfully kept his promise, and never had cause to regret this romantic act of benevolence, the object of which, after twenty years' honest servitude, died under his roof. He preached his funeral sermon, wherein he related the above particulars.

THE GENERAL FAST.

Lines to Spencer Perceval, Esq., M. P.
By T. Hood.

Oh, Mr. Spencer!—
I mean no offence, sir—
Retrencher of each trencher, man or woman's;
Maker of days of ember,
Eloquent member
Of the House of Com——I mean to say,
Short commons—
Thou Long Tom Coffin singing out,
'Hold fast'—
Avast!
Oh, Mr. Perceval! I'll bet a dollar, a
Great growth of Cholera,
And new deaths reckon'd,
Will mark thy Lenten twenty-first and second.
The best of our physicians, when they con it,
Depose the malady is in the air:
Oh, Mr. Spencer!—if the ill *is* there—
Why should you bid the people live upon it?
Why should you make discourses against
courses; [chafe,
While the doctors, though they bid us rub and
Declare, of all resources,
The man is safest who gets in the safe.
And yet you bid poor suicidal sinners
Discard their dinners,
Thoughtless how heav'n above will look upon't,
For man to die so wantonly of want.
By way of a variety,
Think of the ineffectual piety
Of London's bishop, at St. Faith's or Bride's,
Lecturing such chamelion insides,
Only to find
He's preaching to the wind.
Whatever others do, or don't,
I cannot—dare not—must not fast, and won't,
Unless by night, your day you let me keep,
And fast asleep;
My constitution can't obey such censors:
I must have meat
Three times a day to eat;
My health's of such a sort,—
To say the truth, in short,
The *coats* of my stomach are not *Spencers*.

Athenæum.

Fashionable Fasting.—A committee of cooks, with Ude in the chair, has been sitting at Crockford's for some days past, to pass in review various projects for the preparation of salt fish, for the fatal 21st of March.—Three *entrées* of an entirely novel flavour have been already sanctioned by the committee, besides a *purée au morue salé*, invented by the honourable chairman, the copyright of which he has generously presented to the club. With a degree of candour worthy the distinguished place he holds among modern artists, this great man avows that the original idea of this fine composition arose with the natives of the islands of the Zuyder Zee; but there is an immense distance from the Zutje of the Dutch to the *purée* of Ude.—Bleaden, of the King's Head, Cuff, of the Freemason's, and Willis, of the Thatched House, also promise a great variety of novelties for that day. We conclude that two hundred and eighty-six ways of dressing eggs, boasted as the invention of the French, will be put in practice, for the benefit of the sinners of the great world.

CURIOUS EXPERIMENT ON A DOG.

Mr. Harward, a professor of anatomy in the University of Cambridge, is reported to have made the following extraordinary experiment on his pointer dog.

Having opened one of the dog's veins, he permitted the blood to be exhausted, until the vital principle seemed totally extinguished. A glass was held before the mouth of the animal, and nothing appeared that could indicate the smallest symptom of life. Whilst in this situation, Mr. Harward, who had prepared a calf on the occasion, opened one of its arteries, and, by a very ingenious process, instilled the stream of blood which issued from the calf, into the veins of the pointer. As one animal decreased in strength, the powers of the other began to renovate; until, at length, the dog acquired his full strength, and was able to feed in the course of a few hours, and was afterwards hunted, without discovering the least alteration in his manner, from the new blood which had been infused into his system.

The Cabinet Annual Register, and Political, Historical, Biographical, and Miscellaneous Chronicle, for the Year 1831. Foolscap 8vo., pp. 466. Washbourne, London.

This work, the intended appearance of which we announced some weeks back, has now been published for about a fortnight, but, from press of matter, we have been prevented from noticing it before. This delay, however, has at least conduced to our more perfect appreciation of its contents; and we now hesitate not to recommend it most cordially to our readers, as a cheap, elegant, valuable, and amusing production, available equally for immediate perusal and for future reference. We venture to predict that this annual will be a permanent one.

POETRY.

A TRUE STORY.

(*For The Casket.*)

'*Experientia docet.*'

At my outset in life, being free from suspicion,
I thought men all honest, and women all true,
Till woful experience compell'd the admission,
That honour and truth could be found in but few.

Still I left with reluctance my former opinion;
I lov'd not to look on the faults of my kind;
I long'd to discover that virtue's dominion
Was felt and acknowledged by many a mind.

But vain was the search,—indeed, it but tended
To prove what I oft, unbelieving, had heard:
That men had but few noble qualities blended
With much that was odious, base, and absurd.

But I, being born with a generous nature,
With kindly emotions regarding mankind,
Was apt to put confidence in ev'ry creature
Who appear'd to accept of my friendship inclin'd.

From the many I met with, I singled out one,
Whom I trusted, and honour'd, and reckon'd sincere;
But he robb'd me, abus'd me, left nothing undone
That could injure my int'rest, or check my career.

Among those of the fair sex I happen'd to know,
Myrtilla appear'd to be fairest and best;
I lov'd, I ador'd her—she knew it was so—
Explanation ensued, mutual love was confess'd.

Thus things went on smoothly until that there came
A suitor of riches, of title, and pow'r;
And I who had naught but an unblemish'd name
Was coldly regarded from that very hour.

The rich man succeeded—I mark'd it with anguish,
And ventur'd remonstrance, but ah! 'twas in vain:
She left me forlorn and heart broken to languish
Till death puts an end to my sorrow and pain.

Do you, then, who read my sad history, never
Put faith in a woman, or hope for a friend,
For things the most trifling will frequently sever
The bonds you thought firmest, to love put an end.

F. W. G.

* * *

THE MAJORS AND MINORS.

BY ROBIN HOOD.

What meaneth all this squeak and bubble?—
The majors and the minors seem in trouble;
And great is the affray.
What meaneth all this bubble and squeak?—
The majors are not mild, the minors not o'er meek:
But which will win the day?
Truly the times are big with fate;
And Peake and Punch, and pun, and prate,
Threaten fresh hubbub in the state.
In fact, the minors are grown quite minacious,
Threatening their betters;
And, rudely contumacious,
Are plotting and combining
To throw off their fetters.
They now are under-minors, *undermining*
With craftiness and fury
Both Covent Garden and old Drury,
Whom they've caught napping,
And now are sapping.
The minors bounce, the majors look most glum;
While the newspapers
Discuss the dignity and interests of Tom Thumb,
Till we are fairly in the vapours.
The whole world seems in a commotion
About playerfolks and plays,
As if Poole were the ocean,
Planché a planet, Beazley 'Bayes,'
Although it rather sounds like quiz,
'Tis really, really,
As if we all depended on Kenney and on Keeley.—
On Vestris' legs, and Liston's phiz;
As if the Surrey and th' Adelphi—
At least for my poor self, I
So opine,—were guardians of the state,—
The theatres the arbiters of England's fate,
And English morals
Endanger'd by dramatic quarrels;—
As if that noble house which spurns
Title less than Coburg, guided
The public *weal*,
(That *wheel* which takes so many turns,
As we all feel),
And o'er our destinies presided;—
In short, as if the welfare of the age
Depended solely on the stage.

Yes; it is droll—it is, upon my life,
That so much hubbub, fuss, and strife,
So much oration,
And botheration,
Should now be made, as things were at such pass,
That the whole nation
Were mad for frolic, fun, and farce.

What, prithee, is it all about?—
Why all this riot, rows, and rout?
The big and bulky
Managers are sulky,
Taking the sign of *plus*, and looking +;
The while the minors fiercely strut,
With arms a kimbo,
Vowing they'll put
The majors into limbo,
As they shall feel, to their expense and loss.
In fact, the minors wear their mouths so wide
Extended thus (—) in saucy line
From side to side,
That they resemble quite the sign
Of *minus*,—meaning to deride
Their adversaries, and denoting thus
That *plus* is *minus*;—*minus* turned to *plus*;
For, if their reckoning be right,
Poor plus is now *nonplussed* quite.
And now good night;
Perhaps some other time,
Gentles, I'll trouble you with some more rhyme.

Success, then, to the *stage*!—thriving or not thriving,
At least in gallant style 'tis driving
A race, full gallop, all down hill.
The Muses, though, now ride,
Like shabby scrubs, *outside*,
While th' inside passengers are sick and queerly,
The guard asleep, and coachee drunk or nearly,
And all things seem just ready for a *spill*.

Union Magazine.

* * *

VARIETIES.

Soup Extraordinary.—Over the mantle-piece at the Guildhall Coffee House in King Street, Cheapside, is to be seen, in a large gilt frame, a portrait of his present Majesty, surrounded by a very elaborate copperplate inscription, expressive of the gratitude of the English nation to a patriotic and reforming sovereign; by the side of it hangs a placard, on which is written (by the tavern-keeper of course),—'*A plate of this Engraving only Ten Shillings.*'

The assizes and the theatre always open together at York, and it is common to hear the Tykes say, 'Eh lad! ther'le be fun next week—pl'actors be come, and men to be hung, and all.'

In order to prove (says the London Medical and Surgical Journal) the necessity of Temperance Societies, we have merely to state that, during the last four weeks, no less than four thousand and seventy drunken persons were taken to the police stations in the metropolis.

The following advertisement was actually cut out of the *Times* of one of the days of the last month:—

'Wanted, in a gentleman's family, a young lady, as Nursery Governess, to instruct two young ladies in French, music, and singing, with the usual branches of education, and to take the entire charge of their wardrobe. She must be of a social disposition and fond of children, and have the manners of a gentlewoman, as she will be treated as one of the family. Salary, *twelve guineas per annum.*'

In a party of which Porson was a guest, there was also a physician, a Dr. Brocklesby, a descendant of the eminent man who attended Dr. Johnson in his last illness. In addressing Dr. B., Porson always called him Dr. Rock—'Yes, Dr. Rock'—'No, Dr. Rock,' &c.; a name rendered almost infamous by Hogarth in his picture of the March of the Guards. At length Dr. B. became offended, and said, 'Mr. Porson, my name is not Rock—it is Brocklesby,' pronouncing the syllables distinctly. 'Well,' said Porson, 'if Brock—less—B is not Rock, I know nothing of algebra.'

Charity and Gallantry.—The Bishop of Exeter, having established a poorhouse for twenty-five old women, asked Lord Mansfield for an inscription. Upon which his lordship wrote:—'Under this roof, the Lord Bishop of Exeter keeps twenty-five women.'

The Gentleman and his Wives.—A certain man came to Copley, and had himself, his wife, and seven children all included in a family piece.—'It wants but one thing,' said he, 'and that is the portrait of my first wife—for this one is my second.' 'But,' said the artist, 'she is dead, you know, sir: what can I do? she is only to be admitted as an angel.' 'Oh, no! not at all,' answered the other; 'she must come in as a woman—no angels for me.' The portrait was added, but some time elapsed before the person came back: when he returned, he had a stranger lady on his arm. 'I must have another cast of your hand, Copley,' he said: 'an accident befell my second wife; this lady is my third, and she is come to have her likeness included in the family picture.' The painter complied—the likeness was introduced—and the husband looked with a glance of satisfaction on his three spouses: not so the lady; she remonstrated; never was such a thing heard of—out her predecessors must go. The artist painted them out accordingly; and had to bring an action at law to obtain payment for the portraits he had obliterated.

French Poetical Idea of a Dandy.—M. Pacelise, in warning his mistress against the fascinations of such an individual, calls him, '*un millefleur* Judas.'

Young B. has fixed upon a certain day,
'Twixt ten and one, his tailor's bill to pay.
Quære the odds it never will be done?
I quote his words—*exactly ten to one.* T.

TO OUR READERS.

In order to keep pace with the anxiety of our Readers for further engravings and tales from the popular dramas founded on Mr. Wilkie's pictures, we this week publish a double number, with two engravings and twice the usual quantity of letter press. Our next will contain another similar engraving, with an original dramatic tale, at the ordinary price.

The periodicals alluded to in our last as having printed pirated copies of the engravings in The Doings in London, and misrepresented the connexions of The Casket, have since made the *amende honorable* by frankly admitting the fact with regard to the former, and altogether withdrawing their statement respecting Mr. R. Cruikshank. We have therefore the pleasure of closing the transaction by expressing our conviction that the proprietors of those works were not aware, at the time, that they were either invading the property of another or stating that which was not correct.